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Vol. L DECEMBER, 1938 No. 4

The Wilson Bulletin

A Magazine of Field Ornithology

Published by the
Wilson Ornithological Club
Sioux City, Iowa

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THE WILSON BULLETIN

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THE WILSON BULLETIN

A QUARTERLY MAGAZINE OF ORNITHOLOGY

Published by the Wilson Ornithological Club

Vol. L DECEMBER, 1938 No. 4

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LYNDS JONES

BY MRS. H. J. TAYLOR

In the diary of Publius Virgilius Jones for the year 1865 under the date of January 5, is this entry: "Baby Boy born 2 A. M." Two days later the entry reads: "Baby cried all night". The first entry may be taken at face value. The second should not be taken too seriously. In the homes of early settlers there was no separate room for a baby and fathers were sometimes disturbed. The expression "cried all night" meant the baby woke up once or twice during the night. Noticing a prominent facial feature on their new born son the parents exclaimed: "He has his grandfather's chin! He shall have his grandfather's name!" The infant was Lynds Jones.

When Lynds Jones was born his parents, Publius Virgilius Jones and Lavinia Burton Jones, were living in the little town of Jefferson, Ashtabula County, Ohio. The territory from the Western Reserve to the Mississippi River was largely settled by people from the New England States and in turn from this territory Iowa, Nebraska, and Kansas received settlers. The Civil War was over. Young men wanted to make their own footing, attain personal independence, and be their own masters. They had ideals for their families. Their children should have books, music, college education, and if possible, travel. It was for this hope of opportunity that Publius Jones, a mill wright in the little town of Jefferson, gave up home, friends, comforts, and culture and took his wife and seven small children across the Mississippi to locate on a prairie farm three and one-half miles northeast of Grinnell, Iowa. The mournful howl of the Prairie wolf through the night; the terrifying, blinding blizzard; the raging fury of the prairie fire; these were well known to every pioneer of the middle west.

It was a hard year for Lavinia Jones in this new country. In addition to her own family consisting of one daughter and six sons she had under her roof and care three of her brothers. Her babe of only a few months was withering in the sultry, breathless heat of the middle west. Cholera infantum, feared and dreaded by mothers, held

the life of Lynds Jones in the balance for many days. To feed, clothe, and make a home for a family of twelve and tenderly care for a sick infant was indeed a heavy program for Lavinia Jones. How can a woman endure so much? Love and interest give strength and endurance without limit. In the narrow life of the pioneer love and family were lasting interests. A few years of hardship and struggle would bring opportunity to the children and that meant joy to the parents. A forward look can pull a heavy load. Lynds Jones says: "My mother had no artificial charms. She needed none."

Many Iowa settlers were good tree planters and parts of the state had become wooded sections. These were a partial protection against the raging fury of the prairie fire and also against the ruthless fury of the blizzard. After a year on the prairie the Jones family moved to a farm three and one-half miles northwest of Grinnell into a natural grove of oak and hickory trees. What if the cabin was but a single room!—there were trees around it. Near by there were woods—one hundred acres of trees! There was a bubbling spring not far away; and a place to swim; winter would make it into a skating pond. Here was a place that offered free and joyous education to all who had capacity to receive. There were hazel nut bushes gracefully bending their nut-laden branches. Hickory trees with nuts as well as lithe branches for making Indian bows. There were choke cherry trees beautiful with great racemes of white flowers and with oncoming fruit too strongly flavored with tannic acid to be enjoyed—except by small boys. Gooseberries, red raspberries, luscious blackberries, and the sweetest of strawberries were feasts for the children who usually filled up to capacity before they took a supply to the house. The Jones farm was a paradise for children and birds. As soon as it could be done, a five-room story-and-a-half frame building was annexed to the log cabin which henceforth became the kitchen.

Two events of early childhood impressed themselves indelibly on the mind of young Lynds. The first was the total eclipse of the sun on August 7, 1869. The mother had told her children of its coming and they were eagerly awaiting the event. Not knowing the meaning of the sudden darkness roosters crowed vociferously, chickens hastened to their roost, a nearby herd of frightened cattle ran wildly hither and thither. A young herdsman was terrified and almost crazy, while the Jones boys enjoyed the unusual demonstration of the movements of heavenly bodies.

The second, not less memorable event, happened a few weeks later. Lynds was left in charge of his little creeping brother. Sud-

Lynds Jones

denly the little fellow, gabbling loudly, was hastening on all fours toward the interesting object he had spied lying under the stove in the log cabin kitchen. Lynds saw the coiled snake as it lay warming itself and flicking its tongue. Snatching the baby he let out such a terrific yell that it brought his mother instantly to the scene. Screaming, she grabbed both children and slammed the kitchen door with great violence. Hearing the commotion, the father hastened to the house. The rattler was gone. His only possible escape was to get under the loose boards of the kitchen floor. He must be found. The father began to mow the weeds patch near the kitchen. Soon the snake with twelve rattles and a button was held aloft on his scythe.

At the age of five and a half years Lynds began his book education in the district school about a mile away. With its program of classes from A B C to Geography, Physiology, and Algebra the district school had a rare and subtle value that was eliminated by the graded system. Younger pupils absorbed much from the recitations of the older ones and had a keen incentive for advancement into the next class. Nor was promotion held up till the close of the term; it was made when the pupil was ready. Lynds Jones was often "ready".

At the age of seven years Lynds, under the direction of a neighbor boy, named Ivan Wheeler who was not only a good collector but also a good taxidermist, began to make a collection of eggs. That the first, a rare collection of singles, was destroyed by mice and the second was accidentally tipped over ruining every egg, was disappointing but not discouraging to Lynds Jones. Mice had to be reckoned with in those days and pioneer homes were pretty well filled with children, leaving little room for boxes of eggs and specimens of birds. Ivan taught Lynds to collect eggs in full sets and to blow them properly through one hole in the side and also to mark them. From Ivan he also obtained his first book, "Samuel's Nests and Eggs of New England Birds". This book is still in the Jones library. Summing up his results Dr. Jones says: "When I left Iowa to go to Oberlin in 1890 my collection numbered approximately 250 species of birds' eggs, most of them collected by myself, some from exchanging duplicates for species which did not nest in Iowa. This collection I have just [1937] donated to Berry College, Georgia." The founder of this college, the accomplished Martha Berry who gave all her years and all her fortune that mountain children might have educational advantages, rejoiced that Berry College received recognition from a northern educator.

At eleven years of age Lynds Jones worked all summer weeding onions for a neighbor at forty cents a day. His earnings bought a suit

1874—Aged 9

1892—Aged 27
A Graduate of Oberlin

1915—Aged 50
A Golf Enthusiast

1923—Aged 58
And Grandchild

LYNDS JONES

of clothes—with the necessary suspenders thrown in. From that time on he earned all his own clothes by working summers. At the age of seventeen — wages had been raised to seventy-five cents a day — he earned not only enough to buy his clothes but also enough to buy Coues' "Key to North American Birds". This marked the beginning of scientific study for Mr. Jones. Throughout the winter all his spare moments were spent studying the "Key", and how to use it with facility when the spring birds began to arrive. With the "Key" and Samuel's "Nests and Eggs of New England Birds" Lynds Jones had a select library for his work. With the return of the birds the farm work began in earnest. Neither it nor the birds could be neglected. Mornings, from twilight to chore time, were spent in the woods in search of new species; if found he collected a specimen. During the noon hour he identified the specimen and in the evening he wrote up the notes. Now and then a half holiday gave time for trips afield. Even Sunday had its invariable program of church and Sunday school.

When Lynds Jones was about thirteen years old he met "The Pathfinder" and his greed for reading became insatiable. Cooper's Tales, one and all, were devoured and he became Leatherstocking rather than Lynds. With his six-foot gun, made from a pine board, he, with his brothers and the neighbor boys, dramatized the Leatherstocking Tales in the nearby woods. Their war whoops were heard afar. Lynds invariably took the leading part. He didn't act, he was Leatherstocking; imagination had become a reality. He is but one of thousands of boys who are gratefully indebted to Cooper for thrilling adventure in the boundless realm of imagination. In spite of hard work, scarcity of money, and want of comforts, a farm gives children great and rare opportunities of learning what can not be put into books.

Successful farming demands a steady program of work. Publius Virgilius Jones was a hard worker and, in the estimation of his sons, was scarcely second to Samson in strength. He was, however, not a hard task master; ideals for his family were never lost sight of. The Jones farm was successful though it may not have produced its capacity in grain, corn, and hogs. This loss was offset by healthy, happy, mentally alert children who had time for play, for roaming the woods, for knowing birds and trees and flowers. The Jones boys responded to the lure of spring, awaited the return of birds and made whistles when sap was running freely in the willows. They knew the hazy, indescribable atmosphere of Indian summer that meant birds

1926—Aged 61
Still birding

1933—Aged 68
Trimming trees

1936—Aged 71
His 54th Ford car

Date unknown

LYNDS JONES

were preparing to go to warmer climates, droning bees were saying farewell before going into some hollow tree well stored with delicious honey. Winter with its snow and ice and twenty degrees below zero weather is a glorious challenge to exuberant youth. Nature's school is never closed and grades depend solely on capacity to see, to hear, and to think.

Publius Jones must have had Grinnell, the oldest college in the State of Iowa, in mind when he located a few miles from the town which was then the end of the Chicago, Rock Island and Pacific Railroad. Grinnell was a colony town composed from the Eastern States entirely. It had an intellectual atmosphere. Grinnell College merits its reputation for scholarship and thoroughness. It is Congregational but not sectarian. Mr. Jones had three winter terms in the Academy followed by two full years at Grinnell College.

Pioneer families had good food and plenty of it—corn bread was a little too plentiful—but there was scarcely any ready money. A little cash was an absolute necessity when going to college. In western colleges and universities it was customary for young men to board themselves. They walked home Friday nights if it wasn't more than ten or fifteen miles and returned on Monday morning carrying a sack with bread, butter, and vegetables for the ensuing week. Cash for room rent had to be provided somehow. Lynds Jones reduced his cash needs to the minimum. When attending Grinnell College, three and a half miles away, he not only eliminated room rent by walking forth and back, but was also able to assist with the farm work. His daily walk brought him face to face with two board and thirteen wire fences put up to keep the cattle in or out of something. He looked at the fifteen fences. They could not be moved. He accepted the challenge. The board fences he vaulted; two low wire fences he jumped; the remaining eleven barbed wire fences presented a difficult problem. He must crawl under them. The weeds and dirt could be brushed off; to tear his clothes would be a calamity, both financial and otherwise. He removed the barbs from the lower wires, crawled under and went on his way rejoicing. His athletic ability was not lost when he went to Oberlin, where he played tackle and halfback on the Varsity Football Team. He allowed forty-five minutes to walk from the farm to Grinnell and the same to return, but usually he studied his Greek lesson going and his Latin lesson returning and the time was increased somewhat. On reaching home he cultivated corn with his Algebra

fastened to the cultivator. Mr. Jones says: "It was good mental discipline to work out my Algebra lesson that way." When resting the team he stopped at the edge of the woods and checked up on the nesting birds.

Having finished his freshman and sophomore years at Grinnell he went for his junior and senior years to Oberlin College where he graduated in 1892 with the A. B. degree. The college at once gave him the position of Laboratory Assistant. In September, before Oberlin College opened, he married Clara Mabelle Tallman of Grinnell. They went at once to Oberlin and have lived there ever since. Their home has been one of peace and contentment free from all distracting worry, an atmosphere to thrive in and one conducive to fruitful years of which Mr. Jones has had many. In 1895 he received a Master's degree from Oberlin. In 1899 he was promoted to Instructor. In 1905 he was made Associate Professor and in 1922, full Professor. From the University of Chicago, in 1905, he received the degree of Doctor of Philosophy. He was retired in 1930, having served his college continuously for thirty-eight years. He did more than serve his college, for through the lives of many young men and women who went forth from his class room the world has been enriched.

Letters before me are full of gratitude to a teacher who gave lasting values. One of his early students writes: "The course in ornithology with Dr. Jones in the spring of 1897, started a life-long interest which is of the greatest value to me. My father, Professor A. A. Wright of Oberlin College, was for many years head of the Zoology Department and Mr. Jones was his assistant and deeply valued friend and helper. Oberlin was one of the first to include such a course, and Mr. Jones, single handed, certainly made the town and college of Oberlin 'bird conscious'. I recall our sunrise trips. People looked out of their windows and half-opened doors wondering what the queer group was seeing in the tree tops and the sky. Such a group was soon known as Mr. Jones' Ornithological Class. It was a wrench to get up for those early trips but no one who went once would ever miss another. Perhaps the best thing a teacher can do is to arouse the desire to know more and this he certainly did for me and many others."

A student writes thus: "Dr. Jones is a very quiet, modest, retiring, but effective man; a teacher who places the world of nature before you, and with a few guiding remarks expects you to make the discoveries for yourself. When in 1914, for the first time, a major in

ecology at Oberlin was offered I signed up. It was then that I fully realized what an excellent scholar along these lines Dr. Jones was. Today I can say that his teaching has lasting and ever increasing value. It has contributed to the joy of living more than that of any other professor." Another of his students writes: "The name of Lynds Jones brings before me a quiet, dignified student of nature; a strong physique; a rugged character; a rare teacher. This personality I describe by the one word 'homespun'."

In the spring of 1890 half-fare railroad rates enabled Mr. Jones to visit Dr. R. M. Strong at his Wauwatosa, Wisconsin, home. It was a memorable visit. With him he took interesting and helpful trips, especially so was the tramp to the heronry. With Dr. Strong he also went to Pewaukee where he met Captain B. F. Goss, a pioneer ornithologist of Wisconsin. A few weeks later, at the Indianapolis meeting of A. A. A. S. Mr. Jones met Otto Widmann, Amos Butler, Barton W. Evermann and others—men he had known and valued for their writings now became a reality and he a co-worker with them. While in the University of Chicago in 1905 he met Dr. T. C. Stephens and as with Dr. Strong and others there grew a lasting friendship out of the contact. In the summer of 1898, in Washington, D. C., he met Robert Ridgway, T. S. Palmer, and H. C. Oberholser. In New York he met J. A. Allen and Frank M. Chapman. He also met his first Starlings in 1898; a small flock seemed established on one of the little islands in Long Island Sound.

Time evaluates our years. Alert students, enlarged by the inspiration of the class room, express their lives through the avenues opened by a true teacher. Colleges and universities justify their existence in the measure in which they send out men and women able to minister to the needs and welfare of mankind.

Dr. Jones' interests lay preëminently in the field of science. At various times he taught zoology, geology, entomology, dendrology, ornithology, and other allied subjects. He was also curator of the Zoology Museum and in 1922 he became Professor of Animal Ecology. He was at home in all these fields but nearest and dearest to his heart was the field of ornithology. This field he had roamed and enjoyed from earliest childhood. He knew the birds that came and went and those that remained all the year on the Iowa farm. He knew the songs of the birds and the music of the trees. One of his valued friends writes: "Professor Jones has a poetical interest in nature as well as

a scientific view point. He was always painstaking as a field observer with a keen ear and memory for bird songs and notes." One of his students says: "A Conservatory professor told me that Dr. Jones' ear was so perfectly trained that he heard tones which the ordinary human never heard. I also recall Dr. Jones saying that many bird songs were so high that they were not heard by any human ear. To him the sounds of nature were enthralling."

Dr. Jones says: "I organized a class in ornithology in the spring term of 1895. It was the first formal course in that subject ever offered in an American college. The subject has been continuously offered in Oberlin since that time. The first class numbered 27 students, the second 35, and from that on up to a maximum of 137." A former student, now established in natural science work, writes: "Dr. Jones stimulates his students to interest in birds outside of the class room. Several times I went on over night trips with him to Bay Point to observe the warbler migration. Once our combined list of warblers and other birds reached 144 species. The study of bird skins, the use of the balopticon in the class room, and the field trips enabled people to learn the common species. [In 1913] Dr. Jones organized a department of ecology separate from zoology and botany. Only Chicago had preceded him in organizing such a department."

Long before he put it into practice Dr. Jones had the vision for extensive out-of-door study for students. In 1915 the dream became a reality. He took a group of fourteen students in ecology across the country for study in the native haunts of birds. He went by train to Seattle, thence by boat and launch to Neah Bay and Moclips. Of this, the first of thirteen trips across the country with college students, a member of the group says: "I rejoice that I was one of the fourteen students who took the first trip with Dr. Jones to the western coast. He had so often talked of going. With three Indian guides we explored the coast of Washington for 250 miles. We were the first women to visit these little islands. Because they are Bird Reservations we had procured permission from Washington, D. C., to visit them. No other trip that I may ever take will be as marvelous as was this one; it is all so vivid; the delightful incidents would fill a book; the six weeks were all too short.

"This was the first time the college had granted ecology credits for such an outing. I am sure Dr. Jones had no easy task in convincing the college that the study would be worth while and that we weren't

a bunch of jolly girls and boys out for fun. We had to adhere strictly to the rules of the college, such as "No dancing" and "No smoking".

"Again in 1919 I enrolled with a class of twenty for a six weeks' study across the country and on the west coast. This trip was made with five Ford motor cars and one truck. It was before the days of auto camps and we slept under the stars, rain or no rain. In 1920 I again joined the class. These trips gave us something not found in books. We also came to know intimately one of the finest of men as well as a great teacher. Work under Dr. Jones, more than any other professor, gave me that something which has remained an ever present source of joy. These trips were not made without annoyances, but Dr. Jones rarely made the slightest reference to any unpleasant incident."

In the thirteen trips across the country with students Dr. Jones made it a point to visit national parks and other places of interest en route. Twice he took his party to National, Iowa, to see the interesting work done by Miss Althea R. Sherman. Of especial interest was the tower she had built for the Chimney Swifts that were roosting and nesting in it. On several trips he visited the interesting laboratory at Lake Okoboji, Iowa. Those who were able to avail themselves of these out-of-door studies attest to their value. The idea of Nature Schools is deeply rooted and is steadily on the increase.

For his personal study of bird life Dr. Jones took a trip to the west coast in 1900. He was accompanied by one of his students, W. L. Dawson. A Summer Reconnaissance in the West (Wilson Bulletin, 1900, XII, No. 4) is the account of this trip. Also for his own study he made two trips to Alaska and the Yukon, and one to Porto Rico. Exclusive of the birds he listed in Porto Rico Dr. Jones has a Life List of 672 birds. His interest in the subject of birds is boundless. He realizes the study should reach beyond the scientific; it should be popularized to call people to lake and wood, marsh and meadow, to train eyes and ears and to this end he gave much time and effort.

In Fall River, Massachusetts, December, 1888, the Wilson Ornithological Club was founded. Its object was the study of birds in their haunts and habits. Of the twelve founders but three are living, Franklin Lorenzo Burns, Reuben Myron Strong, and Lynds Jones. All three have played a large part in the nurture and welfare of this organization. They have been constant and vital factors through many trying and seemingly hopeless years. Much tenacity of purpose is re-

quired to produce the growth of an idea. In this respect the founders of W. O. C. were not wanting. Unto tenacity they added perseverance and faith. The history of the Wilson Ornithological Club is one of years of struggle crowned with success.

Every office, except that of Vice President—for which I am sure he could qualify—has been held by Lynds Jones. The presidency he held eleven years, from 1890-1893 and from 1902-1908, and again from 1927-1929. He was secretary from 1888-1889, and treasurer from 1894-1901. He was editor from 1888-1924. For thirty-nine years he held office. Any one with such a record must have been satisfactory to all political parties. For thirty-six years Lynds Jones was editor of this would-be club. The signs of life were often dim but nurture never ceased. The editor's job was not all absorbing which was of no great moment as editors draw no pay. They draw the printer's bill which, large or small, some one must pay. On such occasions the editor seized the opportunity of taking the lonely bill out of his pocket and giving it to the printer. Dr. Strong says: "The first number of the Wilson Quarterly was published in 1892 and was edited by Lynds Jones with myself as publisher. It had 40 pages. This was the first number edited by him. It appears as Volume 4, No. 1, but it was the first issue under this name. It was preceded by other publications issued as the organ of the club but different in name and form."

We are grateful to the founders but we are not sorry for them. Life must reach beyond the task by which it earns a living. It must feel the pulse throb of humanity and respond to its needs and interests. The vision of the founders was not in vain, the aim of the organization "to study birds in their haunts and habits" has been fulfilled. From its original membership of twelve the Wilson Ornithological Club now has 838 members and money enough to pay the printer.

Oberlin, in 1930, placed the name of Dr. Lynds Jones on the retired list but Lynds Jones has not retired. His interest in nesting activities of birds and their migration is as keen as ever. In 1937 he taught in Berry College, Georgia. He continues to take field trips. His interests increase with the years. He takes no small part in the civic and educational affairs of Oberlin. He plays golf and tennis if the day is long enough. His garden, out of which he digs weeds and health, is one of choice and beautiful flowers. And Lynds Jones is a welcome guest in the homes of all who know him.

The years of his life have been useful and fruitful. He has the love and high regard of unnumbered students; he is rich in life-long

friendships; this club honors and values him for his constant and unlimited service. Lynds Jones became a Life Member of this club. The Wilson Ornithological Club made Professor Jones an Honorary Member. The years have made Dr. Jones a Beloved Member.

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The Sequence of the Molt. Wilson Bulletin; Vol. XLII, p. 97. 1930.

Berkeley, Calif.

SOME SAW-WHET OWLS IN CENTRAL IOWA[1]

BY THOS. G. SCOTT[2]

In Iowa the Saw-whet Owl (*Cryptoglaux acadica acadica*) is considered "An uncommon and irregular winter visitor. Unrecorded by a number of observers." (DuMont, 1934). This status encourages the submission of data concerning the habits of some Saw-whet Owls in central Iowa during the winter of 1936-37.

Two of these owls were observed in a hawthorn (*Crataegus* sp.) thicket along Beaver Creek near Camp Dodge, Polk County, Iowa, on December 28, 1936. The thicket was about two acres in area, having a density of from eight to twenty trees per square rod. The thorny, interlocked branches provided an extensive barrier of mechanical protection. In relation to the surrounding country, the thicket was bordered on the north and east by wooded pasture and on the south and west by reasonably open fields. On January 4, 1937, another of this species appeared and the population grew to three. At least one owl remained in the thicket until the last observation on February 28. Another report of the Saw-whet Owl in Iowa (made at Des Moines on December 31, 1930) likewise made reference to the use of the hawthorn tree as a daytime refuge (Palas, 1931).

Incidental to these observations, it may be fitting to report a Saw-whet Owl picked up in Ames on February 17, 1937. The owl, having been injured in some manner, died the following day. The specimen is preserved in the Iowa State College Collection.

The owls that remained in the thicket near Camp Dodge were subjected to brief observation at intervals of several days. Although this procedure did not permit the collection of detailed information relative to daily movements of the birds, it was considered advisable as a measure against attracting undue attention to them.

The owls appeared content to remain deep within the thicket during the daylight hours, exhibiting a tendency to use a chosen perch with much regularity. White excrement distributed over the branches, after the habit of raptors, served to indicate the location of each perch. Five perches appeared to be in frequent use, but no more than three owls were observed in the thicket at any one time. The accompanying photograph (Fig. 34) illustrates a preferred perching place and the

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[1]Journal paper No. J-581 of the Iowa Agricultural Experiment Station. Project No. 598. In coöperation with the American Wildlife Institute, U. S. Biological Survey, and the Iowa State Conservation Commission.

[2]Credit is due Mrs. Harold Peasley and Mrs. Ross Thornburg for contributing correlative information.

position of the owl. Most of the perches were from six to seven feet above the ground and on a limb to the southeast side of the tree trunk. The writer knew of only one perch which was not well within the thicket. This was located at the thicket margin in a hawthorn tree grown over with a thick tangle of grape (*Vitis* sp.) vines. Random dropping of pellets and excrement throughout the thicket indicated a slight inconsistency in the owls' use of preferred perches.

While on the perch the owls proved to be excellent subjects for close scrutiny, and it was not difficult to approach within arm's length of them. They sat quietly, unafraid and not too concerned about the presence of other animals in the vicinity. Flocks of Black-capped Chickadees (*Penthestes atricapillus*) working over the outer branches and twigs of an owl's perching tree merely caused it to turn its head and watch them as they passed. There was little activity at the perch other than the usual head turning and movements in regurgitation.

The food habits determination for these owls was made by pellet analyses. The fur, feather, and osteological remains found in the pellets proved easily subject to recognition. Skulls were available for identification of all the mice and shrews except for a part of the white-footed mouse (*Peromyscus* sp.) and meadow mouse (*Microtus* sp.) representation. In consideration of the material at hand, it was thought reasonably accurate to make reference to the genus of mammalian prey not represented by skulls. However, such recognition is treated as questionable. Table I presents an enumeration of the total number of representatives for each prey species. The part of these totals which may be recognized as questionable is entered below the affected total and is indicated by a negative sign. Identification beyond the family group was not attempted for the bird remains.

A list of the potential prey species found within one quarter-mile radius of the thicket center proved helpful in making an evaluation of these food habits. Such forms as white-footed mice, meadow mice, small short-tailed shrews (*Cryptotis parva*), large short-tailed shrews (*Blarina brevicauda*), house mice (*Mus musculus*), Black-capped Chickadees, Tree Sparrows (*Spizella arborea*), Slate-colored Juncos (*Junco h. hyemalis*), Goldfinches (*Spinus t. tristis*), White-breasted Nuthatches (*Sitta c. carolinensis*), Downy Woodpeckers (*Dryobates pubescens medianus*), and Hairy Woodpeckers (*Dryobates v. villosus*) were present in varying numbers dependent upon the plant communities.

FIG. 34. Saw-whet Owl in typical crataegus perching site. January 10, 1937. Johnson Station, Polk County, Iowa. Photograph by Dr. H. R. Peasley.

TABLE 1. Prey Representation.

PREY	Dec. 23	Jan. 4	Jan. 10	Jan. 23	Jan. 24	Feb. 14	Total per Prey Appearance	Percent per Total Prey Appearance	
								Uncorrected	Corrected
Fringillidae		1			1		2	3.0	3.0
Cyrptotis parva		4					4	6.1	6.1
Blarina brevicauda		1					1	1.5	1.5
Peromyscus sp.	2	13	1	2	8	13	39	60.0	44.6
		–2			–3	–5	–10		? 15.3
Microtus sp.		1		4	9	4	18	27.6	15.3
		–1		–4		–3	–8		? 12.3
Mus musculus		1					1	1.5	1.5
Number of Pellets	1	17	1	5	16	16			

About 97 per cent of the food was procured from among mouse and shrew populations; the remaining three per cent was of birds (probably Slate-colored Juncos). The brunt of the predation was borne by white-footed mice and meadow mice. Sixty per cent of the total prey appearance was by white-footed mice. About one-fourth of this showing, however, must be treated as being reasonably accurate but subject to question. Similarly, about one-half of the 27.6 per cent of meadow mice must be considered questionable. These findings leave no doubt as to the value of the food habits of the owls investigated. They also conform with the results of Errington (1932) in southern Wisconsin.

The prey species represented would indicate that most of the hunting was done in the adjacent open fields spotted with a low shrubby growth. This is certainly true for the mammalian prey, and quite possibly the birds represented were captured at roost in the lesser ragweed (*Ambrosia artemisiifolia*) patches found in these same fields. This is also reflective of an availability of prey peculiar to predation of all types.

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THE CHESTNUT-COLLARED LONGSPUR IN COLORADO

BY ALRED M. BAILEY AND ROBERT J. NIEDRACH

The rolling prairies extending to the eastward of the continental divide are the wintering grounds of flocks of small passerine birds; Desert Horned Larks (*Otocoris a. leucolaema*) occur in great flocks in the northeastern portion of the state, and occasionally smaller groups of McCown's Longspurs (*Rhynchophanes mccowni*) are found nearby, or mixed with the more abundant horned larks. The Chestnut-collared Longspur (*Calcarius ornatus*) is not common in winter, if we may judge from our limited observations and from the number of specimens in our collection. Sclater (1912) lists various winter records, but we have only three specimens, all taken at Barr, Adams County, Colorado, in December, 1909. Although the Chestnut-collared Longspur has been found nesting in states adjacent to Colorado, it has not been recorded breeding here, so far as we have been able to find.

In the spring of 1932, Captain L. R. Wolfe stopped at The Colorado Museum of Natural History, and mentioned that he had seen Chestnut-collared Longspurs in a broad valley south of Cheyenne, Wyoming, just over the Colorado line. He believed them to be nesting and Mr. F. W. Miller visited the location and succeeded in finding nests and collecting several sets of eggs, which we have in the Museum collection.

During the past two seasons (1936 and 1937) we have visited the locality on several occasions and have found that the birds are numerous in this broad valley, where they were nesting with McCown's Longspurs, Lark Buntings, Desert Horned Larks, and Mountain Plovers as near neighbors. We made our first trip on August 8 and found the various prairie species assembled in flocks; they were exceedingly scarce except in the vicinity of a small waterhole and about a field of irrigated alfalfa, where hundreds of longspurs and horned larks were feeding upon insects. It was difficult to distinguish between the McCown and Chestnut-collared in flight and we found them extremely wild; we ran several miles each way from our little valley without finding Chestnut-collared Longspurs elsewhere, although McCown's Longspurs were common upon the level prairie adjacent. On September 5 we again visited the area and found birds still numerous about the waterhole where we had no difficulty in securing a few specimens in their fall plumage.

The summer of 1937 was well advanced before we had an opportunity to visit the breeding grounds on June 19. The prairie was covered with wild flowers—the prairie primrose, penstemon, and wall-

flowers making a natural garden; and black-breasted male Chestnut-collared Longspurs were dotted about the valley. They rested upon song perches or hovered in the air upon outstretched wings as they poured forth their satisfaction with the world in general, and then, at the conclusion of their songs, drifted downward to their weedstalks. It is strange how similar are the songs and antics of the males of various species of prairie birds during the spring. Even the nuptial flight of such unrelated birds as the Mountain Plover and longspurs are similar, although, of course, the songs themselves have nothing in common.

The song of the Chestnut-collared reminds us of that of the Western Meadowlark, and time and again we were deceived as we heard their clear calls. The nuptial flight of the males of the two longspurs differs somewhat; the McCown mounts high in the air, singing all the while, and then floats downward with outspread wings making a definite "V". The Chestnut-collared tends to circle more, dropping less abruptly, and they seem to quiver their wings as they descend to earth, their dark underparts black against the light blue of the sky.

It is an easy matter to locate nests of both species of longspurs after the song perches have been discovered, for the females are almost sure to be tucked away in the near vicinity, and it is only a matter of walking about until they flush from under foot. We found many nests of both species with contents ranging from fresh eggs to half-grown young, and imagined we could distinguish a choice of nesting sites in that the majority of those of the Chestnut-collared were in rolling country, on the slopes and along the valley floor, while the McCowns were more abundant on the level prairie. The McCowns were found adjacent to the Chestnut-collared, but the latter were not observed nesting on the flat areas. In other words, the flat expanses were typical nesting areas of the McCown's Longspurs and the valleys of the Chestnut-collared, but the former extended their nesting range into that of the latter. There was no place, however, where we could draw a line between nesting areas.

The nests of both species were cup-like affairs tucked in depressions excavated by the female, lined with grasses, hair, and feathers; they were usually concealed between some bit of prairie vegetation, and oftentimes were beautifully placed near prairie asters, phlox, or flowering cactus. Even when in the open, however, cut by only a few blades of wiry grass, they were difficult to see. They had from three to five eggs of various markings, no two sets that we found being alike.

Whenever we found a nest of Chestnut-collared young, the male was extremely solicitous. Frequently he would alight within a few

FIG. 35. Chestnut-collared Longspur.
By the Authors.

feet of us, voicing protest, without losing the small insects which crammed his beak. We erected our photographic blinds to observe the birds better, and to secure our film record for our picture library. Hardly had we concealed ourselves until the male was back, chucking insects down coöperative young, but the female would not come to the nest, although she sat some distance away with food-filled beak. When only eggs were in the nest, however, conditions were reversed, for then it was the female that returned to the nest and the male remained in the distance. We worked with too few birds to generalize, however: it may have been that other individuals would have reacted differently. We found twelve nests of the Chestnut-collared Longspurs in the course of our ramblings over this isolated bit of Colorado prairie, and were glad of a chance to add a pictorial record of this species to our files of the nesting birds of our state.

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THE COLORADO MUSEUM OF NATURAL HISTORY,
DENVER, COLO.

NEST BUILDING BEHAVIOR IN THE LOGGERHEAD SHRIKE GROUP

BY ARCHIBALD JOHNSON

Statements concerning male Loggerhead Shrikes[1] (*Lanius ludovicianus*) aiding in nest building are placed by Miller[2] in the group of writings on life history which "yet are not founded on well proved facts". Without regard to whether or not such behavior is normal, this paper will attempt to show that one male Loggerhead assisted in nest building.

The incomplete nest of this bird and his mate was discovered in Woodbury Township, Stutsman County, North Dakota, on May 6, 1937, in a dead poplar tree hardly forty-five yards from a farmhouse. It rested about sixteen feet from the ground in an angle formed by the

[1]This is a case to show the inadequacy of the vernacular names in the current A. O. U. Check-List. The author does not wish to distinguish between *Lanius ludovicianus migrans* and *L. l. excubitoides*. But there is no common term to include the two subspecies. Hence the term "Loggerhead" is here allowed to stand for the specific group.—ED.

[2]Systematic revision and natural history of the American shrikes (Lanius). By Alden H. Miller. Univ. Calif. Publ. Zool., Vol. 38, No. 2, 1931, pp. 11-248, page 168.

bole and a cluster of twigs and slender branches springing from the east quadrant of the trunk.

These birds were not shy. In fact, late in April they had examined the Virginia creeper about the porch on the farmhouse while in search of a nest site. From May 6 to May 27 (when the eggs were destroyed by some marauder) the activities at the nest were observed from a distance of twenty-eight yards without the birds being disturbed. As was to be expected, they hotly resented all trespassing in the immediate vicinity of the nest.

When first located, the nest was so incomplete that a working bird could be seen plainly through the walls. Materials used in the construction of it were fragments of Russian thistles and soft plant substances. From May 6 through May 14, 604 minutes were spent in watching the building activities at the nest. During this time the birds brought material to the nest thirty-five times with time intervals between trips averaging 8.5 minutes. The calculation of time intervals was based only upon time lapses between trips. A more detailed summary of these data is given in Table I.

TABLE I. Summary of the nest-building activities of a pair of Shrikes (*Lanius ludovicianus* subsp.) as further described in the accompanying paper.

Date	Hours of Observation	No. Min. Spent in Observation	No. Trips to Nest with Material	Average No. Minutes Between Trips	
May 6	7:37-8:18 A.M.		12	3.16	
	11:14-11:45 A.M.	91	7	4.42	
	11:45 A.M.-12:04 P.M.		0	0	
May 7	12:50-1:04 P.M.	14	0	0	
May 8	2:56-3:11 P.M.	15	0	0	
May 9	8:20-9:35 A.M.	75	7	9.07	
May 10	2:27-4:30 P.M.	123	0	0	♀ first fed by ♂
May 11	3:15-3:27 P.M.	12	0	0	
May 12	7:12 P.M.	1	0	0	A bird busy in nest
	9:35-10:27 A.M.		3	14.25	
May 13	10:55 A.M.-12:16 P.M.	168	6	13.20	
	12:44-1:19 P.M.		0	0	
May 14	2:03-3:48 P.M.	105	0	0	
May 15					First egg laid

In the enumeration of details relative to the building activity of the male, "arrange" implies all activity of a bird in a nest under construction while making newly gathered material a part of that nest.

On May 6 at 7:59 A.M., a bird entered the nest with material and arranged. One minute later (8:00) the other bird of the pair brought material and gave it to the first bird which continued arranging until

8:01. Immediately the second bird, without material, entered the nest and arranged for a few seconds only. By 8:05 A. M. a bird again entered the nest with material and arranged. It left at 8:06 when the other bird entered and arranged material it had brought until 8:07.

At 8:20 A. M., May 9, a bird entered the nest without material and stayed only a few seconds. At 8:21 the other bird entered with material and arranged while the bird that had first been in the nest rested on a near twig.

Then at 11:31 A. M., May 13, a bird entered the nest from the south without material and arranged. By 11:33 the second bird brought material to the nest tree, but did not go to the nest before going to the fifth poplar south. Here, after dropping some material, the bird went to the nest and deposited the remainder. It was arranged by the bird that had been busy in the nest since 11:31 and that left at 11:34½.

These are the only instances observed in which the two birds brought material to, or worked about, the nest at the same time. Instances in which one bird gave material to another were studied closely. In no case was the material mistakable for food. Also at none of these times was begging heard.

One of these birds must have been the male of the pair since at no time were more than two birds seen in the territory. Although in certain species individuals in addition to the mated pairs concerned are known to assist in caring for broods of young (Skutch, A. F., "Helpers at the Nest", *Auk*, LII, p. 257), such behavior would seem to be intolerable to shrikes, not to mention assistance in nest building.

Whether or not the male shared equally with the female in nest building could not be determined objectively. However, since at only six times were visits to the nest concurrent for the two birds, and furthermore, since males usually attend the females rather closely during nest building (Miller, *op. cit.*, p. 166) making possible participatory visits seldom other than coincidental with those of the females, it would seem reasonable to conclude that this male did not assume any great portion of the burden of nest building.

JAMESTOWN, N. D.

THE SKULLS OF DUCKS

BY CYRIL E. ABBOTT

Several years ago a young man whose father belonged to a hunting club presented me with the heads of several different species of wild ducks. It seemed such a pity to discard these without putting them to some use, that I finally decided to preserve the skulls. A casual examination of these indicated that, on the basis of the forms of the lacrymals alone, the marsh ducks (Mallards) may be distinguished from the open water species (Scaups). This led to an examination of the remaining movable bones of the skull, in the expectation that they would yield further evidence of grouping. The results, though different from those expected, are so interesting that they are described in detail.

The two longest axes of each bone were measured, and recorded in millimetric fractions. (See Table I). The selection of axes, though more or less arbitrary, was made consistently; corresponding points were selected for measurement in all specimens. The measurements are represented in the figures, especially Figure 37, by the dotted lines. Each set of crossed lines represents the measurements of one bone; excepting the jugal and quadratojugal, which, for obvious reasons, were measured as one bone.

It was impractical to attempt the measurement of the cranial bones, in part because their curvature made determination of axes difficult, and also because the sutures between the cranial bones of birds are very indistinct.

Despite fundamental differences in form between the lacrymals of Mallards and Scaups, there is actually a graded series existing: from the terete lacrymal process of the Redhead to the expanded and very thin lacrymal process of the Green-winged Teal.

With the exception of the lacrymals, there is very little difference in the proportions of corresponding bones in the skulls of various species of ducks. In some cases the dimensions are also identical. The vomer is of equal size in several species; so also is the maxilla and the squamosal. The set of bones exhibiting the greatest variation in this respect are the jugal-quadratojugals.

To continue briefly a comparison of certain bones: the fractional index for the articular of the Mallard is 10/10; for the Black Duck it is 11/12; for the Green-winged Teal it is 6/6; for the Blue Goose it is 12/14. It is of interest that the index of this bone is identical (10/10) for the Lesser Scaup, Ringneck, Redhead, and Mallard.

TABLE 1. Measurements of the Skull Bones of Ducks. Denominators indicate the longest axes; numerators the second longest axes. Numbers represent millimeters.

	Premaxillary	Maxillary	Nasal	Lacrymal	Vomer	Palatine	Prevomer	Squamosal	Quadrate	Pterygoid	Jugal-Quad-Jugal	Dentary	Splenial	Angular	Articular	Ocular Orbit
Lesser Scaup	13/30	6/30	6/9	10/15	4/18	6/22	7/10	20/20	9/11	4/11	2/30	4/40	4/22	6/33	10/10	15/20
Ringneck	13/30	6/30	6/8	10/15	4/15	5/17	4/12	18/18	9/12	3/10	2/34	4/40	4/15	5/32	10/10	15/18
Redhead	10/30	7/30	6/9	11/16	4/15	3/10	5/15	20/20	5/6	4/15	2/40	4/22	2/13	2/9	10/10	15/20
Mallard	5/9	8/40	9/14	15/25	4/20	6/27	5/20	23/25	10/15	4/15	1/20	4/60	2/25	3/20	10/10	18/22
Black Duck	16/45	9/44	10/14	16/25	4/20	7/25	5/20	25/25	10/15	4/12	2/45	5/60	6/20	4/21	11/12	17/20
Green-winged Teal	8/17	6/30	6/10	10/15	2/15	3/20	3/10	15/20	8/10	3/8	1/30	3/40	2/15	5/30	6/6	14/18
Blue Goose	8/30	6/30	9/10	15/15	5/15	10/30	5/15	25/30	10/15	5/15	2/40	4/60	5/20	7/40	12/14	17/20
Red-breasted Merganser	4/30	2/15	6/6	10/10	3/15	4/20	3/10	18/20			2/30	3/45	4/15	6/36		15/18
Pintail	12/35	7/40	9/12	15/20	4/20	4/25	5/20	20/23	10/12	3/12	2/42	4/55	5/20	7/45	10/10	

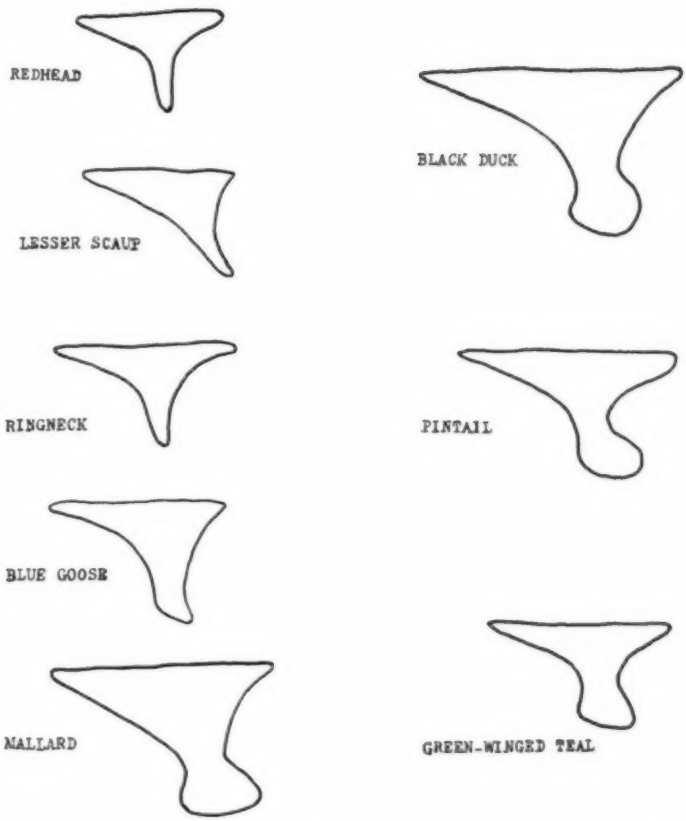

FIG. 36. Outlines of the lacrymal bones in various species of ducks.

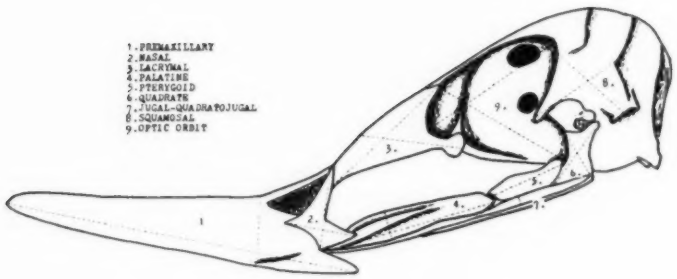

FIG. 37. Left lateral aspect of the Pintail skull.

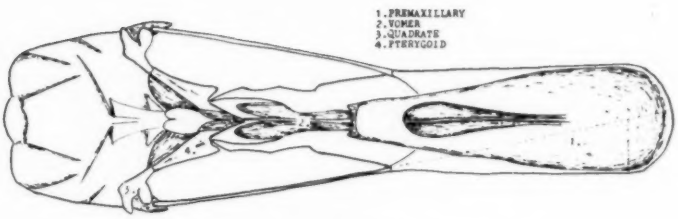

FIG. 38. Ventral aspect of the Pintail skull.

FIG. 39. External lateral aspect of the lower mandible of the Pintail skull.

Correspondence in the dimensions of the bones in various species follows no definite classification. It certainly does not correspond with taxonomic relationships: not even with similarities in other bones. Thus the prevomer of the Mallard and the Black Duck both have the index 5/20, but so does the Pintail; while that of the Teal is 3/20!

The similarity in form and dimension in the movable bones of the skulls of various species of ducks is probably due to the interrelationships of these parts. The living bird is able to flex the upper mandible, thus increasing the size of the mouth opening. This ability also enables the duck to work limnaceous material through the mouth. The action may be duplicated in a wet skull by holding the cranium firmly in one hand and flexing the premaxillary with the other. It may then be observed that during this action the quadrates rotate forward and upward; the jugal-quadratojugals, together with the palatines, are pushed forward; the palatines are moved forward by the pterygoids; these last two pairs of bones sliding their ental processes along the vomer and the bases of the interorbital processes. This action, by forcing forward the prevomer and maxillaries, raises the mandible.

It is obvious that this mechanism must be delicately adjusted, and hence, probably, the correspondence of its parts in different species of ducks.

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HOW VALUABLE ARE WOODLAND CLEARINGS TO BIRDLIFE?

BY DANIEL W. LAY

Ecological field work conducted between June 1 and September 30, 1936, in Walker County, Texas, permitted a limited census of bird populations in several types of interior woodland and corresponding margins of clearings. Most of the counts were made in or near second-growth pine-oak-hickory woodland. This association includes shortleaf and loblolly pine, red oak, post oak, water oak, sweetgum, winged elm, and black hickory. The younger types of cut-over are quite open and contain many of the developmental species which occur in recently abandoned fields.

Kashkarov (Acta Universitatis Asiae Mediae, Series VIII-a, Zoologia, Fasc. 1, 1927), whose method follows closely that used by Grinnell and Storer (Animal Life in the Yosemite, 1924, pp. 22-35), has discussed rather thoroughly quantitative methods of analyzing bird associations. Space units are difficult to define when one is working with birds, so time-unit methods which involve listing and counting all birds seen on a two- or three-hour excursion in one type are recommended. Census trips are made afoot. The above workers take census records only for the nesting season in determining resident associations; but counts of bird populations at all seasons of the year have been found useful to show important seasonal changes.

An expression of relative abundance was the object of the present census which is based upon thirty-minute time-unit counts of individuals as well as of species observed. In making the counts the observer walked slowly and recorded all birds seen during each thirty-minute period. With field glasses in hand, stops were made whenever birds were heard or glimpsed. Usually only the birds actually seen were recorded; but occasionally, when the unmistakable song of a familiar bird was heard in nearby cover, time was not consumed in stalking for sight of the individual. Individuals not readily recognized were listed as unidentified. The path of the observer followed no definite line. Interior counts were made more than one hundred yards from margin; usually they were much deeper within the woodland. Marginal counts were made along the edges of clearings. No bird more than twenty-five yards from the edge was included in these marginal counts. Nearly all the counts were made before 10 A. M. This served to make the counts more comparable; however, weather may have as much effect on the counts as the time of day. Generally, two or four counts were made during a morning, alternating between a

margin and its corresponding interior. This further reduced variation in census conditions.

A summary of thirty such counts follows:

TABLE 1. Relative abundance of Birds in Margins and Interiors. (From counts made in Walker County, Texas, between July 1 and September 30, 1936).

TYPE OF INTERIOR	MARGIN			INTERIOR		
	No. of Counts	Ave. No. Species	Ave. No. Birds	No. of Counts	Ave. No. Species	Ave. No. Birds
Oak-palmetto river bottom	3	6	17	2	3.5	4.5
Oak-elm river bottom	3	6.7	19	4	4.25	6.25
1-4 year cutover pine	2	6.5	15.5	3	5.3	13.3
10-14 year cutover pine	3	3.3	10.3	5	4.4	8.2
15 and older cutover pine	3	9.7	20.7	2	6	11
Summary of all counts	14	6.5	16.6	16	4.6	8.5

The summary of thirty counts, showing that margins of clearings averaged 16.6 birds of 6.5 species and that interiors average 8.5 birds and 4.6 species per thirty-minute period, apparently gives a true picture of the relative value of margins and interiors for birdlife.

All of the very common species appeared in both margins and interiors. Some of them, however, were more than twice as numerous in margins as in interiors. Among these were the Cardinal, Mourning Dove, Blue Jay, Red-headed Woodpecker, and Sparrow Hawk.

Species that were found only in margins include Blue Grosbeak, Orchard Oriole, Mockingbird, Blue-gray Gnatcatcher, Red-cockaded Woodpecker, Turkey Vulture, Red-winged Blackbird, Scissor-tailed Flycatcher, Migrant Shrike, Ruby-throated Hummingbird, and Sycamore Warbler. The last two species were found once in fourteen counts so their appearance only in the margin may not show true relative abundance. Several others in this list frequently may be found in interiors but they are, nevertheless, characteristic of the margins.

Characteristic birds of the interiors were the Tufted Titmouse, Pine Warbler, White-breasted Nuthatch, Brown-headed Nuthatch, Red-eyed Vireo, and the Barred Owl. With the exception of the Tufted Titmouse, which was more than twice as numerous in interiors as in margins, these species were not observed in margins.

Common species which were not distinctly more numerous in either margins or interiors were the Chickadee, Carolina Wren, Red-bellied Woodpecker, and Yellow-billed Cuckoo.

The relations of birds to marginal vegetation have long been recognized by ornithologists. The present study serves merely to empha-

size with numerical examples the value of clearings to birdlife. The margins of clearings were found to contain 41 per cent more species and 95 per cent more individual birds than the corresponding woodland interiors. There is abundant evidence, also, that mammals are attracted to the margins of clearings.

Obviously a primary essential to the management of woodland areas for wildlife, especially for birdlife, is the provision of clearings with extensive margins. The influence of a clearing usually extends less than a hundred yards into the interior of the woodland, consequently maximum development of an area for wildlife requires numerous, well located clearings. The interior of a large clearing is as depleted of wildlife as is the interior of the woodland, hence the need for small but numerous clearings.

Summary

(1) Thirty-minute time-unit bird counts are useful for expressing the relative abundance of birds in two or more types.

(2) An average thirty-minute walk in the margin of a Walker County, Texas, pine woodland clearing may be expected to disclose 16 or 17 birds of 6 or 7 species. A similar walk in the interior of woodland more than 100 yards from the edge of a clearing discloses 8 or 9 birds of 4 or 5 species.

(3) The margins of clearings have 95 per cent more birds representing 41 per cent more species than the interiors of corresponding woodland.

(4) In the management of pine woodland the provision of well scattered, small (less-than-thirty-acre) clearings is distinctly favorable to birdlife.

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A PRELIMINARY LIST OF THE BIRDS OF HOT SPRINGS NATIONAL PARK AND VICINITY

BY WILLIAM H. DEADERICK

Hot Springs National Park is located southeast of the center of Garland County, this county lying just southwest of the center of Arkansas. The generally rough topography of the county is drained by the Ouachita River and its tributaries and by the tributaries of the Saline River. The steep ridges, which are mostly of zigzag or parallel patterns, range up to 1400 feet above sea level. They make up parts of six distinct mountain ranges separated more or less from each other by a system of three relatively wide basins.

The exposed rocks of this county represent a rather continuous deposition of sands, mud, and chert in the Ouachita Embayment which persisted in the present Ouachita Mountain area throughout most of the Paleozoic era. The sedimentary rocks of this region are essentially all silicious and include the following formations, listed in order from oldest to youngest: Mazarn shale, Blakely sandstone, Womble shale, Bigfork chert, Polk Creek shale, Blaylock sandstone, Missouri Mountain shale, Arkansas novaculite, Hot Springs sandstone, Stanley shale, Jackfork sandstone, and Atoka sandstone. Most of the ridges are topped with Arkansas novaculite and there are small areas of igneous rocks exposed in a few places. I am indebted to Mr. H. W. Lix of the National Park Service, for these geologic data.

The soil is thin, rocky, dry, acid, and relatively sterile over almost the entire county. From the standpoint of agricultural productiveness Garland stands near the bottom of the list of Arkansas counties.

There is a small area of Upper Austral Zone in the extreme northern portion of the county west of Jesseville, an area more or less sausage-shaped, running approximately east and west and not more than four by eleven miles in extent. None of my bird studies were made in this section but were confined to the Lower Austral Zone.

The Ouachita River enters the county at the center of its western boundary, winds irregularly southeast and makes its exit near the southeast corner. In 1924 the Arkansas Light and Power Company completed a dam across the Ouachita River, forming Lake Catherine, some six miles of which is in the southwest corner of this county. Another dam was built across this river four miles south of the City of Hot Springs forming Lake Hamilton. The gates to the dam were closed December 17, 1930, and the initial operation of the hydro-electric plant was January 1, 1932. This lake is at an elevation of 400 feet above sea level, has a river length of twenty-four miles, a shore

line of 170 miles, and covers an area of 7,150 acres. The depth varies from wide shallows over the inundated flats to more than 100 feet in the river channel. Depending on the rainfall and the amount of water required for the generative units the water level varies. A maximum vertical fall of twenty-five feet has been reached once. These variations produce marked changes in the shore line, resulting in wide beaches at low levels.

The average temperature in this section during January is about 42° F., that for July about 80° F. The rainfall during 1934 was 53.67 inches, in 1935, 59.66 inches, in 1936, 38.04 inches.

Seventy-eight per cent of Garland County is in forest, at least seventy-five per cent of which is in second growth pine, principally short leaf pine (*Pinus echinata*) and loblolly pine (*Pinus taeda*). Forest fires occur often enough to sweep the ground cover of the pine woods clean.

There are no extensive areas of deciduous trees in the county, such as there are lying mostly along the streams. A not inconsiderable portion of this hardwood was destroyed in clearing the beds of Lakes Catherine and Hamilton. The commonest deciduous trees are the various species of oaks, sweet gum (*Liquidambar styraciflua*), black gum (*Nyssa sylvatica*), and American elm (*Ulmus americana*). In the more open flats are found *Crataegus* ssp. and persimmon (*Diospyros virginiana*) as well as blackberry and reproduction growth of winged elm (*Ulmus alata*). There is the usual ground shelter of grass and weeds but cattle are permitted to roam at large and forage grasses are kept closely cropped.

The principal food plants are wild cherry (*Prunus serotina*), blackberry and dewberry (*Rubus* ssp.), hackberry (*Celtis* ssp.), pokeberry (*Phytolacca decandra*), service-berry (*Amelanchier canadensis*), Indian cherry (*Rhamnus caroliniana*), red mulberry (*Morus rubra*), French mulberry (*Calicarpa americana*), mistletoe (*Phoradendron flavescens*), wild grape (*Vitis* ssp.), poison ivy (*Rhus toxicodendron*), sumac (*Rhus copallina* and *R. glabra*), black haw (*Viburnum* ssp.), dogwood (*Cornus florida*), and various elms (*Ulmus* ssp.). The seed producing weeds and other plants are estimated at about 350 varieties. Mr. H. R. Gregg of the National Park Service, kindly furnished these botanical data.

In Lake Hamilton the decided fluctuations of the water level are not conducive to a wide variety of food plants for water fowl. "Musk grass", however, is abundant and is a favorite food with many water birds. A specimen of this was sent to Dr. Marshall A. Howe, of the

New York Botanical Garden, who kindly identified it as *Chara robbinsii.*

It is only about forty miles north of Hot Springs to the Arkansas Valley. From there north the proportion of deciduous trees is at least a reversal of that in this section, in fact there are extensive areas of forest in which little pine is found. About twenty-five miles south of us begins the Gulf Coastal Plain. In that part of the state there are large tracts of deciduous forest and in the bottomland and along the main rivers and smaller streams there are bands of practically one hundred per cent of hardwood types including cypress. The fact that the Hot Springs area is wooded largely with second growth pine and lies between two sections rich in deciduous woods, may account for the scarcity or absence of some species of birds, and the paucity of individuals which are more or less common in some other parts of the state. Two or three hours easy flight would enable most birds to pass us by. Particularly noticeable is the small number of warblers found in this vicinity. The only migratory movement I have ever seen in this section which could be called a "wave" is that of the Myrtle Warbler which is also a winter resident. The transients pass here the latter part of March and early April and again in early November in great numbers.

On the other hand there is a variety, and in the case of some species, a considerable number of individuals, of water birds.

A line drawn due north through Lake Hamilton transects Lake Taneycomo and Lake of the Ozarks, both of which are artificial lakes in Missouri. Lake Taneycomo, 155 miles north of Hot Springs and in the southern part of Missouri, is twenty-five miles long and covers 5,000 acres. Lake of the Ozarks, about 265 miles north of here, is the largest body of impounded water in the world, over 129 miles long and covering more than ninety-five square miles. This line crosses also the Arkansas River some fifty miles north of Hot Springs and, continued south about 180 miles, the Red River in Louisiana. It could hardly be maintained that this line has been adopted as a new migratory lane for it lies in about the center of the widest and most used of the known migratory avenues but it does afford suitable feeding stations at convenient intervals. About 140 miles to the east is the much traveled Mississippi River route but I know of nothing comparable to the west of us. It is not improbable that during seasons of drouth water birds will concentrate along lanes affording a certain water supply. The effect of recently impounded water on the water bird life of this section is shown by the addition of thirteen water birds

to the state list, by the observation of four water birds of which there is only one previous record in the state, four of which there are only two previous records, and two recorded by only four observers.

Within the limits of the National Park the greatest enemy of bird life is probably the cat. It is estimated that twenty are killed annually by the park rangers and that there are yet probably fifty at large. Public Enemy No. 1 to breeding birds in this vicinity is undoubtedly the Blue Jay, our most abundant bird with the exception of the English Sparrow. Crows also are numerous and are notorious nest robbers. Hawks and owls are relatively rare. Aside from the cat the only mammals which may be predators of any importance are the opossum and the squirrel. Our predacious snakes, which are in moderate numbers only, are the black snake (*Coluber constrictor* ssp.), the pilot black snake (*Elaphe obsoleta obsoleta*), and the coach-whip (*Masticophis flagellum flagellum*). The man-element in bird destruction is almost negligible. I know of no collectors of either birds or eggs in this region. There is probably the usual number of air guns and small bore rifles in the hands of the boys but poor marksmanship prevents many kills.

The List

Common Loon. *Gavia immer immer.* Fairly common fall transient, rare winter resident. Arrivals, October 5-24. My 1935 observations were recorded in the *Auk*, July, 1936, p. 349.

Horned Grebe. *Colymbus auratus.* Fairly common fall transient, rare winter resident. Arrivals, October 1-15. My first observation was reported in the *Auk*, July, 1936, p. 349.

Pied-billed Grebe. *Podilymbus podiceps podiceps.* Common winter resident. Arrivals, August 2-September 6; latest records, April 16-22; one record for July 3, 1935. Usually seen as singles or small groups, largest of 13.

Double-crested Cormorant. *Phalacrocorax auritus auritus.* Common transient. Spring arrivals, March 26-April 18; latest spring records, May 8-13. Fall arrivals, September 16-25; latest fall records, November 17-December 17.

Water-turkey. *Anhinga anhinga.* Very rare transient. I have only one record, October 30, 1931.

Great Blue Heron. *Ardea herodias herodias.* Permanent resident, fairly common in spring, common in summer and fall, uncommon in winter.

WARD'S HERON. *Ardea herodias wardi.* Observations made July 29, August 4, 5, and 11, 1936. On August 5 there was a pair, on the other dates, singles.

AMERICAN EGRET. *Casmerodius albus egretta.* Common summer visitant. Arrivals, July 22-23; latest records, September 16-October 26.

LOUISIANA HERON. *Hydranassa tricolor ruficollis.* Rare summer visitant. One was seen August 1, 1937, two singles August 8, 1937. and one August 19, 1937.

LITTLE BLUE HERON. *Florida caerulea caerulea.* Common summer visitant. Arrivals, July 4-27; latest records, September 28-October 10. An off-season record for May 14, 1935, another for May 18, 1936. Of 632 individuals enumerated during the summers of 1935 and 1936 six have been in the blue phase.

EASTERN GREEN HERON. *Butorides virescens virescens.* Common summer resident. Arrivals, April 14-18; latest records, September 9-23. All the nests I have found have been in water oak trees (*Quercus nigra*).

AMERICAN BITTERN. *Botaurus lentiginosus.* I have only one record, November 17, 1936. A specimen was taken by some local hunters and presented to me.

COMMON CANADA GOOSE. *Branta canadensis canadensis.* Uncommon fall transient. Arrivals, October 19-24.

LESSER SNOW GOOSE. *Chen hyperborea hyperborea.* Uncommon transient. One spring record, March 25, 1936; fall arrivals, October 24-November 8.

BLUE GOOSE. *Chen caerulescens.* Rare transient. Singles were seen October 25 and 30, 1937.

COMMON MALLARD. *Anas platyrhynchos platyrhynchos.* Common transient, uncommon winter resident. Arrivals, October 21-26; latest record, March 26.

COMMON BLACK DUCK. *Anas rubripes tristis.* Uncommon transient, rare winter resident. Spring arrivals, about the middle of April; fall arrivals, during the last of October.

GADWALL. *Chaulelasmus streperus.* Common transient. Fall records, October 17-December 28.

BALDPATE. *Mareca americana.* Fairly common transient. Spring records, April 5-6; fall records, October 12-November 12.

AMERICAN PINTAIL. *Dafila acuta tzitzihoa.* Common transient, uncommon winter resident. Fall arrivals, September 20-28.

GREEN-WINGED TEAL. *Nettion carolinense.* Fairly common transient, uncommon winter resident. First fall record, November 13.

Blue-winged Teal. *Querquedula discors.* Abundant transient. Spring records, April 2-May 10; fall, August 25-November 2.

Shoveller. *Spatula clypeata.* I have only one record, October 5, 1936.

Wood Duck. *Aix sponsa.* My single record is for January 10, 1935.

Redhead. *Nyroca americana.* Uncommon transient. Earliest record, October 28; latest, November 14.

Ring-necked Duck. *Nyroca collaris.* Common winter resident. Arrivals, September 16-October 29; latest records, April 4-May 13.

Canvas-back. *Nyroca valisneria.* Fairly common transient. Earliest fall record, October 24.

Greater Scaup Duck. *Nyroca marila.* Rare transient and winter resident. Earliest fall record, October 7.

Lesser Scaup Duck. *Nyroca affinis.* Common winter resident. Arrivals, September 27-October 5; latest records, April 2-May 23.

Buffle-head. *Charitonetta albeola.* Fairly common transient, rare winter resident. Earliest fall record, November 17.

Ruddy Duck. *Erismatura jamaicensis rubida.* Common transient, uncommon winter resident. Arrivals, October 10-November 4.

Hooded Merganser. *Lophodytes cucullatus.* My only record is for October 26, 1936.

American Merganser. *Mergus merganser americanus.* I have only one record, January 28, 1937, when a single and a group of six were seen on Lake Hamilton.

Red-breasted Merganser. *Mergus serrator.* Uncommon fall transient. Arrivals, October 24-November 14. My earliest observations were reported in the *Auk*, July, 1936, p. 349.

Turkey Vulture. *Cathartes aura septentrionalis.* Common permanent resident. The ratio of my records for this species to those of the Black Vulture is as six to one.

Black Vulture. *Coragyps atratus atratus.* Fairly common permanent resident.

Sharp-shinned Hawk. *Accipiter velox velox.* Uncommon transient.

Cooper's Hawk. *Accipiter cooperi.* Uncommon, probably a permanent resident. One was recorded May 2, 1937.

Eastern Red-tailed Hawk. *Buteo borealis borealis.* Rare transient. Two spring records, March 13 and 18; one fall record, November 4.

Northern Red-shouldered Hawk. *Buteo lineatus lineatus.* Uncommon permanent resident.

SOUTHERN BALD EAGLE. *Haliaeetus leucocephalus leucocephalus.* Uncommon permanent resident. Reported in the *Auk*, July, 1936, p. 349.

MARSH HAWK. *Circus hudsonius.* I have made only three observations, September 11 and October 3 and 20, 1936.

OSPREY. *Pandion haliaëtus carolinensis.* Fairly common summer resident. Arrivals, April 7-May 6; latest records, October 26-November 4. I have seen as many as four at one time on a small portion of Lake Hamilton.

EASTERN SPARROW HAWK. *Falco sparverius sparverius.* Uncommon permanent resident.

EASTERN BOB-WHITE. *Colinus virginianus virginianus.* Common permanent resident.

RING-NECKED PHEASANT. *Phasianus colchicus torquatus.* Only one has been observed, May 3, 1936.

EASTERN TURKEY. *Meleagris gallopavo silvestris.* Rare permanent resident. One was killed about twelve miles from Hot Springs by a local hunter, April 16, 1937.

KING RAIL. *Rallus elegans elegans.* One was killed by a local hunter, December 22, 1935. Reported in the *Auk*, October, 1936, p. 455.

AMERICAN COOT. *Fulica americana americana.* Abundant transient, common winter resident. Arrivals, August 27-September 28; latest records, May 12-June 12. Seen in rafts of a thousand or more during the fall migration.

PIPING PLOVER. *Charadrius melodus.* A single specimen was collected August 10, 1936.

SEMIPALMATED PLOVER. *Charadrius semipalmatus.* Fairly common fall transient. Earliest record, August 30; latest, October 12; largest group seen, three.

KILLDEER. *Oxyechus vociferus vociferus.* Common permanent resident.

AMERICAN GOLDEN PLOVER. *Pluvialis dominica dominica.* Uncommon transient. Observed from March 28-April 14, 1936, and September 9, 1936. The largest group numbered five. Reported in the *Auk*, October, 1936, p. 455.

BLACK-BELLIED PLOVER. *Squatarola squatarola.* Uncommon fall transient. Seen in summer plumage, September 14, 16, and 17, 1936; in winter plumage, October 28, 29, and November 1, 1936. The largest group was one of six.

American Woodcock. *Philohela minor.* I have no personal records of this species but reports of reliable sportsmen convince me that it is found here in increasingly small numbers.

Wilson's Snipe. *Capella delicata.* Uncommon transient. Spring arrivals appear during the latter half of April; fall, August 16-October 14.

Upland Plover. *Bartramia longicauda.* Uncommon fall transient. Earliest record, August 10; latest, September 5. Largest group observed, one of twenty-two.

Spotted Sandpiper. *Actitis macularia.* Common transient. Spring arrivals, May 7-20; fall, July 21-August 10. Have never seen more than two together.

Eastern Solitary Sandpiper. *Tringa solitaria solitaria.* Rare transient. Spring arrivals, May 1-18; only one fall record, September 13.

Western Willet. *Catoptrophorus semipalmatus inornatus.* Uncommon transient. Spring arrivals, May 3-20; fall arrivals, August 16-September 15.

Greater Yellow-legs. *Totanus melanoleucus.* Fairly common transient. Fall arrivals, August 23-September 5; latest record, November 6. I have no spring records.

Lesser Yellow-legs. *Totanus flavipes.* Common transient. Spring arrivals, May 1-4; fall arrivals, August 3-September 23; latest fall record, October 29.

Pectoral Sandpiper. *Pisobia melanotos.* Common transient. Spring arrivals, May 7-12; fall arrivals, first week in August. Seen from August 5-October 3. Largest flock observed, thirteen; most commonly as singles, pairs, or small groups. My first observation reported in the *Auk*, July, 1935, p. 324.

White-rumped Sandpiper. *Pisobia fuscicollis.* Rare transient. Two observations only, May 12, 1935, and April 24, 1936. See the *Auk*, July, 1935, p. 324.

Baird's Sandpiper. *Pisobia bairdi.* Rare transient. Only one record, September 16, 1936.

Least Sandpiper. *Pisobia minutilla.* Fairly common transient. Spring arrivals, May 13-14; numerous fall observations between August 17 and November 2. Largest flight seen, fifteen.

Red-backed Sandpiper. *Pelidna alpina sakhalina.* November 2, 1936, two of these were seen feeding with seven Least Sandpipers and November 12, 1936, another pair was observed.

STILT SANDPIPER. *Micropalama himantopus.* Rare transient. Two observations only, August 26 and September 2, 1936, each of a single bird.

SEMIPALMATED SANDPIPER. *Ereunetes pusillus.* Fairly common transient. Spring arrivals, May 12-16; fall, on or about August 10. Has been seen in flights up to twenty-five in number. My first observations here and in eastern Arkansas were recorded in the *Auk*, July, 1935, p. 324.

BUFF-BREASTED SANDPIPER. *Tryngites subruficollis.* Fairly common fall transient. Numerous records between August 8 and September 13. Largest group seen, thirteen. All I have seen were feeding in the grass above the shore line.

SANDERLING. *Crocethia alba.* Rare transient. Only two records, September 16 and October 29, 1936.

WILSON'S PHALAROPE. *Steganopus tricolor.* Rare fall transient. Singles were seen August 27 and September 10 and 11, 1936.

HERRING GULL. *Larus argentatus smithsonianus.* Uncommon winter resident. Arrivals, September 24-October 24; latest records, May 3-20. Largest group observed, one of eight.

RING-BILLED GULL. *Larus delawarensis.* Fairly common but irregular winter resident. Arrivals, August 21-November 2; latest records, February 7-May 3. Largest group recorded, twenty-nine.

FRANKLIN'S GULL. *Larus pipixcan.* Rare transient. My only record, a flight of nine observed September 29, 1936.

BONAPARTE'S GULL. *Larus philadelphia.* Uncommon transient. Observed in 1936, October 1, a single; October 17, three; October 25, a pair; October 31, a flight of sixty; and November 7, a single.

FORSTER'S TERN. *Sterna forsteri.* Fairly common. I have seen them during May (after the 13th), June, July, August, September, and October (to the 10th). Largest flight, twelve.

COMMON TERN. *Sterna hirundo hirundo.* Uncommon transient. Earliest record, May 20; latest, September 10. Largest group seen, six. See the *Auk*, July, 1936, p. 350.

LEAST TERN. *Sterna antillarum antillarum.* Fairly common. Seen irregularly through most of June, July, August, and early September. Largest group observed, twenty.

CASPIAN TERN. *Hydroprogne caspia imperator.* Fairly common fall transient, from August 31-September 29. Largest flight seen, eleven. First observations reported in the *Auk*, July, 1936, p. 350.

Black Tern. *Chlidonias nigra surinamensis.* Abundant transient. Spring arrivals, May 12-24; fall, July 24-August 6. I have seen flights up to one hundred or more.

Eastern Mourning Dove. *Zenaidura macroura carolinensis.* Common permanent resident.

Yellow-billed Cuckoo. *Coccyzus americanus americanus.* Common summer resident. Arrivals, May 4-7; latest records, August 7-September 11.

Black-billed Cuckoo. *Coccyzus erythrophthalmus.* I have only one record, May 5, 1936.

Barn Owl. *Tyto alba pratincola.* One was killed in 1935 and the mounted specimen is now on display at the shop of a local taxidermist.

Southern Screech Owl. *Otus asio asio.* Uncommon permanent resident.

Great Horned Owl. *Bubo virginianus virginianus.* One was captured alive in the National Park, September 2, 1936, by Mr. H. W. Lix, National Park Naturalist. It was measured, photographed, and released the next day.

Northern Barred Owl. *Strix varia varia.* Uncommon permanent resident.

Short-eared Owl. *Asio flammeus flammeus.* My single record for this species is for February 3, 1937.

Chuck-will's-widow. *Antrostomus carolinensis.* Uncommon summer resident.

Eastern Whip-poor-will. *Antrostomus vociferus vociferus.* Fairly common summer resident. Arrivals, April 18-May 13; latest records, June 26-July 11.

Eastern Nighthawk. *Chordeiles minor minor.* Uncommon summer resident. Arrivals, May 17-31; latest record, September 10.

Chimney Swift. *Chaetura pelagica.* Abundant summer resident. Arrivals, March 28-30; latest records, October 7-18.

White-throated Swift. *Aeronautes saxatalis saxatalis.* A specimen was taken alive on the eleventh floor of a local office building and given to Mr. H. R. Gregg, National Park Naturalist, who reported it in the *Auk*, October, 1935, p. 452.

Ruby-throated Hummingbird. *Archilochus colubris.* Common summer resident. Arrivals, April 9-15; latest records, September 3-21.

Eastern Belted Kingfisher. *Megaceryle alcyon alcyon.* Common permanent resident.

Southern Flicker. *Colaptes auratus auratus.* Common permanent resident.

Southern Pileated Woodpecker. *Ceophloeus pileatus pileatus.* Fairly common permanent resident.

Red-bellied Woodpecker. *Centurus carolinus.* Abundant permanent resident.

Red-headed Woodpecker. *Melanerpes erythrocephalus.* Abundant summer resident, rare winter resident.

Yellow-bellied Sapsucker. *Sphyrapicus varius varius.* Uncommon winter resident. Arrivals, October 2-4; latest records, April 7-19.

Eastern Hairy Woodpecker. *Dryobates villosus villosus.* Fairly common permanent resident.

Southern Downy Woodpecker. *Dryobates pubescens pubescens.* Common permanent resident.

Eastern Kingbird. *Tyrannus tyrannus.* Fairly common summer resident. Arrivals, April 15-18; latest records, August 23- September 10.

Northern Crested Flycatcher. *Myiarchus crinitus boreus.* Common summer resident. Arrivals, April 19-22; latest records, August 6-September 15.

Eastern Phoebe. *Sayornis phoebe.* Fairly common permanent resident. A nest which I found was used for two broods in 1935 and again in 1936.

Least Flycatcher. *Empidonax minimus.* Fairly common spring and fall transient. Earliest spring record, April 29; earliest fall record, September 12.

Eastern Wood Pewee. *Myiochanes virens.* Common summer resident. Arrivals, April 20-May 1; latest records, September 15-October 1.

Prairie Horned Lark. *Otocoris alpestris praticola.* My sole record is for April 3, 1936.

Tree Swallow. *Iridoprocne bicolor.* My only observation of this species was made April 23, 1936.

Bank Swallow. *Riparia riparia riparia.* Uncommon transient. Several were observed May 4, 1937, flying with Rough-winged, Tree, and Barn Swallows.

Rough-winged Swallow. *Stelgidopteryx ruficollis s erripennis.* Common summer resident. Arrivals, April 2-7; latest records, October 14-29.

Barn Swallow. *Hirundo erythrogaster.* Uncommon transient. Spring arrivals, May 6-10; fall, on or about October 9.

Northern Cliff Swallow. *Petrochelidon albifrons albifrons.* Uncommon transient. Seen April 27, 1937, flying with Tree and Barn Swallows.

Purple Martin. *Progne subis subis.* Common summer resident. Arrivals, March 13-20; latest records, August 13-16.

Northern Blue Jay. *Cyanocitta cristata cristata.* Permanent resident. Our most abundant bird with the possible exception of the English Sparrow. Have seen them carrying nesting material as early as March 8. Flocks observed October 4-8 may indicate migration.

Eastern Crow. *Corvus brachyrhynchos brachyrhynchos.* Abundant permanent resident.

Carolina Chickadee. *Penthestes carolinensis carolinensis.* Common permanent resident.

Tufted Titmouse. *Baelophus bicolor.* Abundant permanent resident.

White-breasted Nuthatch. *Sitta carolinensis carolinensis.* Abundant permanent resident, distributed nearly evenly throughout the year.

Red-breasted Nuthatch. *Sitta canadensis.* Rare transient. My records are for spring only, March 17-31. Reported in the *Auk*, July, 1935, p. 324.

Brown Creeper. *Certhia familiaris familiaris.* Uncommon winter resident. Earliest record, November 1; latest, March 27.

Western House Wren. *Troglodytes aedon parkmani.* My two records are for April 14 and September 24, 1936. The skin of one of the specimens was identified for me by Dr. Herbert Friedmann.

Eastern Winter Wren. *Nannus hyemalis hyemalis.* Uncommon winter resident. Records too few to determine arrival and departure dates.

Bewick's Wren. *Thryomanes bewicki bewicki.* Uncommon winter resident, remaining from about October 6 to about April 15.

Carolina Wren. *Thryothorus ludovicianus ludovicianus.* Abundant permanent resident.

Eastern Mockingbird. *Mimus polyglottos polyglottos.* Abundant permanent resident with no apparent seasonal variation in prevalence. Its militant territorialism is not confined to the breeding season.

Catbird. *Dumetella carolinensis.* Common summer resident. Arrival on or about April 20; latest records, October 2-22.

Brown Thrasher. *Toxostoma rufum.* Fairly common permanent resident. Have seen them carrying nesting material as early as March 14.

EASTERN ROBIN. *Turdus migratorius migratorius.* Abundant permanent resident except during the last three months of the year when observations are relatively fewer. Spring migratory influx denoted by flocks in March. Raise two broods.

WOOD THRUSH. *Hylocichla mustelina.* Abundant summer resident. Arrivals, April 13-17; latest records, September 21-24.

EASTERN HERMIT THRUSH. *Hylocichla guttata faxoni.* Fairly common winter resident. Arrivals, on or about October 20; latest records, April 18-19.

OLIVE-BACKED THRUSH. *Hylocichla ustulata swainsoni.* Uncommon transient. Singles were seen May 5, 8, 9, 10, and 12, 1937.

GRAY-CHEEKED THRUSH. *Hylocichla minima aliciae.* Uncommon transient. Spring records, April 27-May 8; one fall record, November 19.

BLUEBIRD. *Sialia sialis sialis.* An abundant permanent resident. Have seen them copulating as early as February 19.

BLUE-GRAY GNATCATCHER. *Polioptila caerulea caerulea.* Common summer resident. Arrivals, March 30-April 4; latest records, September 2-28.

EASTERN GOLDEN-CROWNED KINGLET. *Regulus satrapa satrapa.* Uncommon winter resident. Arrivals, October 25-28; latest records, February 23-March 20.

EASTERN RUBY-CROWNED KINGLET. *Corthylio calendula calendula.* Fairly common winter resident. Arrivals, October 5-8; latest records, April 29-May 5.

AMERICAN PIPIT. *Anthus spinoletta rubescens.* Fairly common transient. Spring arrivals during the first week in April; fall, about the middle of October.

CEDAR WAXWING. *Bombycilla cedrorum.* Erratic winter resident.

MIGRANT SHRIKE. *Lanius ludovicianus migrans.* Common permanent resident. Little if any variation in seasonal prevalence.

STARLING. *Sturnus vulgaris vulgaris.* On October 27, 1936, I watched a flight of sixty or more feeding near Lake Hamilton. Specimens were collected.

WHITE-EYED VIREO. *Vireo griseus griseus.* Common summer resident. Arrivals, March 28-April 1; latest records, September 21-25.

YELLOW-THROATED VIREO. *Vireo flavifrons.* Uncommon spring transient, very rare summer resident. Arrivals, March 27-30.

BLUE-HEADED VIREO. *Vireo solitarius solitarius.* Rare transient. One spring record, April 29; two fall records, each November 1.

Red-eyed Vireo. *Vireo olivaceus.* Common summer resident. Arrivals, April 13-20; latest records, August 24-September 18.

Philadelphia Vireo. *Vireo philadelphicus.* Rare transient. A male was collected May 8, 1937.

Eastern Warbling Vireo. *Vireo gilvus gilvus.* Rare transient. One record, April 29.

Black and White Warbler. *Mniotilta varia.* Common summer resident. Arrivals, on or about March 28; latest records, September 19-October 14.

Tennessee Warbler. *Vermivora peregrina.* Rare transient. I have only two records, May 9, 1935, and September 19, 1936.

Orange-crowned Warbler. *Vermivora celata celata.* Rare transient. My observations were reported in the *Auk*, July, 1936, p. 350.

Northern Parula Warbler. *Comsothlypis americana pusilla.* Uncommon transient. Spring arrivals, March 27-April 30; fall arrivals, September 10-19. I have one summer record, July 11, 1935.

Eastern Yellow Warbler. *Dendroica aestiva aestiva.* Rare transient. I have only two records, May 8 and 9, 1935.

Magnolia Warbler. *Dendroica magnolia.* Rare transient. Arrivals, May 6-12; one fall record, September 19.

Myrtle Warbler. *Dendroica coronata.* Abundant transient, fairly common winter resident. Arrivals, October 4-November 1; latest records, April 22-May 4.

Black-throated Green Warbler. *Dendroica virens virens.* Uncommon transient. Spring arrivals, April 22-29; fall arrivals, October 5-24.

Blackburnian Warbler. *Dendroica fusca.* Rare transient. I have only two records, May 7, 1935 and April 29, 1936.

Chestnut-sided Warbler. *Dendroica pensylvanica.* Rare transient. A single specimen was seen May 5, 1937.

Bay-breasted Warbler. *Dendroica castanea.* Very rare transient. One was collected May 9, 1937.

Black-poll Warbler. *Dendroica striata.* Rare transient. My single record, May 11, 1935.

Northern Pine Warbler. *Dendroica pinus pinus.* Fairly common permanent resident. Flock movement noted especially during September and October.

Northern Prairie Warbler. *Dendroica discolor discolor.* Fairly common summer resident. Arrivals, April 28-May 12; latest records, August 24-29.

LOUISIANA WATER THRUSH. *Seiurus motacilla.* Fairly common summer resident. Arrivals, March 27-April 11; latest records, July 21-August 23.

KENTUCKY WARBLER. *Oporornis formosus.* Uncommon summer resident. Arrivals, April 22-May 11; latest record, August 24.

CONNECTICUT WARBLER. *Oporornis agilis.* Rare transient. I have only one record, April 28, 1936.

MOURNING WARBLER. *Oporornis philadelphia.* My only record is for May 29, 1935.

NORTHERN YELLOW-THROAT. *Geothlypis trichas brachydactyla.* I have only one record. A specimen collected October 4, 1936, was identified for me by Dr. Herbert Friedmann.

MARYLAND YELLOW-THROAT. *Geothlypis trichas trichas.* Common summer resident. Arrivals, April 9-18; latest records, July 15-August 6.

YELLOW-BREASTED CHAT. *Icteria virens virens.* Fairly common summer resident. Arrivals, April 22-27; latest records August 1-September 5.

HOODED WARBLER. *Wilsonia citrina.* Uncommon summer resident. Arrivals during the first half of April; latest record, September 10.

WILSON'S WARBLER. *Wilsonia pusilla pusilla.* Uncommon transient. Spring arrivals, May 13-18; fall arrivals, September 10-21.

AMERICAN REDSTART. *Setophaga ruticilla.* Uncommon spring transient, rare fall transient. Spring arrivals, May 7-15; one fall record of arrival, September 10.

ENGLISH SPARROW. *Passer domesticus domesticus.* Abundant permanent resident. I have seen them carrying nesting material every month in the year and copulating as early as January 28.

BOBOLINK. *Dolichonyx oryzivorus.* Rare transient. Two were recorded May 8 and one May 9, 1937, all males.

SOUTHERN MEADOWLARK. *Sturnella magna argutula.* Common permanent resident; less prevalent during the winter.

WESTERN MEADOWLARK. *Sturnella neglecta.* Rare transient. A flock of about thirty, in full song, was recorded November 13, 1937.

ORCHARD ORIOLE. *Icterus spurius.* Abundant summer resident. Arrivals, April 15-17; latest records, August 18-23.

BALTIMORE ORIOLE. *Icterus galbula.* Uncommon spring transient, rare fall transient. Spring arrivals, April 29-May 3; one fall record, September 16.

EASTERN REDWING. *Agelaius phoeniceus phoeniceus.* Common summer resident, uncommon winter resident. Arrivals of summer residents, March 9-23; latest records of summer residents, July 4-August 10.

Rusty Blackbird. *Euphagus carolinus.* I have only three records, April 3 and November 15 and 21, 1936.

Bronzed Grackle. *Quiscalis quiscala aeneus.* Uncommon permanent resident, rare during the last half of the year.

Eastern Cowbird. *Molothrus ater ater.* Fairly common summer resident, uncommon winter resident.

Scarlet Tanager. *Piranga erythromelas.* Uncommon summer resident. Arrivals, April 27-28; late records too meager to determine departures.

Summer Tanager. *Piranga rubra rubra.* Fairly common summer resident. Arrivals, April 20-22; latest records, September 14-23.

Eastern Cardinal. *Richmondena cardinalis cardinalis.* Abundant permanent resident.

Rose-breasted Grosbeak. *Hedymeles ludovicianus.* Uncommon transient. Single females were observed May 5 and 8 and a male May 12, 1937.

Indigo Bunting. *Passerina cyanea.* Fairly common summer resident. Arrivals, April 23-26; latest records, September 8-October 7.

Dickcissel. *Spiza americana.* My only record is for April 29, 1936.

Eastern Purple Finch. *Carpodacus purpureus purpureus.* Uncommon winter resident. Usually in the company of Goldfinches. Earliest record, November 10; latest, April 9.

Northern Pine Siskin. *Spinus pinus pinus.* One observation only, March 30, 1936. See the *Auk*, October, 1936, p. 456.

Eastern Goldfinch. *Spinus tristis tristis.* Abundant transient, fairly common winter resident, uncommon summer resident. Spring flights occur from the latter part of March to the middle of April.

Red-eyed Towhee. *Pipilo erythrophthalmus erythrophthalmus.* Uncommon winter resident. Arrivals, October 11-31; latest records, April 15-18.

Eastern Savannah Sparrow. *Passerculus sandwichensis savanna.* Uncommon transient. Spring arrivals, April 2-May 12; fall, October 15-20.

Eastern Grasshopper Sparrow. *Ammodramus savannarum australis.* Only one observation, May 1, 1936.

Vesper Sparrow. *Pooecetes gramineus gramineus.* Uncommon transient. Observed March 23, 24, April 8 and 9, 1937.

Eastern Lark Sparrow. *Chondestes grammacus grammacus.* Common summer resident. Arrivals, April 6-27; latest records, August 6-September 29.

Bachman's Sparrow. *Aimophila aestivalis bachmani.* A specimen was collected in the National Park by National Park Naturalist H. W. Lix. The skin is in my collection.

Slate-colored Junco. *Junco hyemalis hyemalis.* Abundant winter resident. Arrivals, October 24-25; latest records, April 9-11.

Eastern Tree Sparrow. *Spizella arborea arborea.* I have only one record, January 27, 1937, when a flight of about forty was seen.

Eastern Chipping Sparrow. *Spizella passerina passerina.* Common permanent resident.

Eastern Field Sparrow. *Spizella pusilla pusilla.* Common winter resident, very rare summer resident. Winter residents arrive October 18-25; latest records, April 21-22. I observed a single individual September 12, 1936. H. R. Gregg, National Park Naturalist, found a nest containing four eggs upon which the parent was sitting May 13, 1936.

White-crowned Sparrow. *Zonotrichia leucophrys leucophrys.* Fairly common winter resident. Arrivals, October 28-November 2; latest records, April 11-May 3.

White-throated Sparrow. *Zonotrichia albicollis.* Abundant winter resident. Arrivals, October 11-20; latest records, May 4-9.

Eastern Fox Sparrow. *Passerella iliaca iliaca.* Rare winter resident. My records are too scattering to give arrival and departure dates.

Lincoln's Sparrow. *Melospiza lincolni.* Fairly common spring transient, uncommon fall transient. Spring arrivals, April 15-26; fall, during the first half of October. Ate regularly at my feeding station, thirty feet back of the house, during the spring of 1936.

Swamp Sparrow. *Melospiza georgiana.* Rare winter resident. I have too few records to determine length of stay.

Mississippi Song Sparrow. *Melospiza melodia beata.* Song Sparrows are fairly common winter residents. They arrive October 28-31 and remain until March 23-April 8. Of six skins (all in my collection) sent to Washington for identification, four were *juddi* and two *beata.* This small number of identifications can not determine the relative frequency of these varieties. Much further study is necessary to ascertain the presence or absence of other subspecies, particularly *M. m. melodia,* and their relative frequency.

Dakota Song Sparrow. *Melospiza melodia juddi.* See comments on preceding variety.

Hot Springs, Ark.

COURTSHIP AND NESTING OF THE GREAT HORNED OWLS

BY FREDERICK M. BAUMGARTNER

During the years 1933-1936 the author was engaged in a study of the Great Horned Owls (*Bubo virginianus*) for his doctor's thesis at Cornell University. Besides extensive field work at Lawrence, Kansas, and especially at Ithaca, New York, the study involved a thorough perusal of ornithological literature of the subject. The following section of the thesis presents an account of the courtship and nesting activities through incubation, emphasizing those angles of the subject in which original research has added to the fund of knowledge previously published.

Courtship

On bright moonlight nights the hooting of the horned owls begins to become noticeable about a month before the actual mating begins. By the time of actual selection of mates one can go into horned owl country and be certain of hearing their notes. Then on a clear night several birds can be distinguished, calling back and forth steadily for a few hours after dusk and again toward morning. At times the hooting lasts practically all night.

The length of the courtship period has been very difficult to determine, because of the fact that the males call occasionally at most seasons of the year. However, the period when the males are hooting vigorously lasts for a month or six weeks. On the other hand the answering calls of the females are heard for only a week or two, toward the end of the six-week period. This period began in late November and lasted until about the first of January at Lawrence, Kansas. At Ithaca, New York, as would be expected in a more northern latitude, the dates were about a month later.

The actual courtship display has been witnessed and described in careful detail by Chief Red Eagle (1929). Audubon (1856) and Maynard (1881) mention varied actions and notes.

Judging from its effect upon other owls of the species and the circumstances under which it is given, hooting of the male has a threefold function. As with the songs of birds in general, hooting seems to be an expression of physical vigor and vitality. At times the male appears to hoot for the mere pleasure of hearing his own voice, and the notes produced are an indescribable assemblage of hoots, chuckles, screeches, and squawks given so rapidly and disconnectedly that the effect is both startling and amusing. Such "language" is often heard when several birds gather together during the mating season and in-

dulge in vocal battles. On rare occasions similar outbursts are heard at other seasons of the year (Forbush, 1929).

A second function of hooting is its challenge to others of his sex. In regions where horned owls are common the males do a great deal of competitive hooting from favorite perches in their territories. Thus in the creek bottoms south of Lawrence, Kansas, where one horned owl territory was often hemmed in on two sides by the ranges of other individuals, one bird would hoot and in regular sequence as many as four or five others would answer. It was seldom that two birds were heard calling simultaneously.

The third and most important function of hooting is to attract a mate. During the mating season the challenging, deep, rich tones of the males are occasionally interspersed with the higher and huskier notes of the females. I have never definitely identified the hoot of a female horned owl at any time except the mating and nesting period and doubt if they do much calling at other seasons. Even at that season they do not seem as vociferous as the males. The latter may call back and forth at regular intervals for hours at a time, while the female owl's calling periods, at short and indefinite time intervals, seldom exceed more than fifteen to twenty minutes.

Mating

Mr. Fred Hastie, of Lawrence, Kansas, has witnessed the final stages of the courtship that culminated in the act of copulation. The nodding and bowing of the birds became quite violent for a period and then they quieted down and went through many repetitions of the billing and cooing performance. Finally the female crouched down on the limb and the male mounted her back in the fashion of a barnyard fowl. A detailed account of this performance has apparently not been recorded in the literature.

Nesting Sites

There is some evidence to suggest that Great Horned Owls may select nesting sites several months before the eggs are laid. At Lawrence, Kansas, horned owls were frequently observed during the fall and winter in territories where young birds were subsequently seen. Errington (1932) likewise noted that during the fall and winter birds roosted close to stick nests which were later occupied. However, the birds did not actually move into the nest until a short time before the eggs were laid.

From the records of Bendire (1892), Bent (1938), and numerous others, it is apparent that the choice of nesting sites of the Great Horned Owls throughout their wide range includes almost every type

of situation in which birds nest, a range of variation unequalled by any other North American bird. From extreme heights of almost a hundred feet to badger and coyote dens in the ground, the situations include old nests of other birds, hollow trees and stumps, holes and ledges on cliffs, and even the open ground.

Throughout the timbered regions of eastern North America the birds have been most frequently recorded to occupy old nests of crows, hawks, ospreys, bald eagles, herons, and squirrels. Most of these situations are from twenty to seventy feet from the ground and located near the edge of fairly dense timber. Hollows in trees or limbs are often reported, especially in the southern states, and in more hilly country ledges on cliffs are not uncommonly described. Bendire (1892) quotes Captain B. F. Goss to the effect that hollows in trees and limbs were the preferred sites in Wisconsin before the cutting of the larger timber. Recent records indicate that the large percentage of birds are now using old stick nests in this region (Errington, 1932).

In western North America where small caves or niches in cliffs and mountain slopes are available, tree sites are often passed up for these more inaccessible situations. Old magpie nests are particularly favored in the Northwest.

In treeless regions such as the Prairie Provinces of Canada and the Great Plains of western United States low cliffs, buttes, railroad cuts, and even low bushes appear just as satisfactory as more elevated sites. Ground nests are occasionally reported here and appear to be more common than in other parts of this bird's range.

Bendire (1892) records that one observer noted these large birds sitting in the mouths of badger and coyote dens near the Umatilla Reservation in northeastern Oregon. This observer believed that the owls were nesting in these burrows. Other unusual sites include hay barns (Kirkwood, 1925), prehistoric ruins (Sugden, 1928) and the tower of a cathedral (Bendire, 1892).

In the deserts of the Southwest cactus plants take the place of trees and horned owls often occupy old nests among the thorny branches.

The Nest

Observations in the Ithaca region suggest that when there are several satisfactory nests in a territory the birds will choose a larger nest preferably in a fairly open situation. It is obvious that a nest completely enclosed by interlacing branches would not allow such bulky birds to approach or depart quickly in time of emergency and all nests which I have examined have been at least moderately exposed.

There is a wide range in the size and structure of horned owl nests, as may be readily surmised when one considers the diverse situations in which they dwell and the variety of original owners. Ground nests, nests in caves, on rock ledges, and in hollow trees often do not meet the ordinary concept of that term. In such situations the eggs are laid on the bare ground, wood, or stone.

In general stick nests seem to be preferred to leaf nests. This is probably due to the fact that they are larger and offer firmer foundations. However at times horned owls display little care in their selection of tree nests, adopting structures so dilapidated and flimsy that they fall apart and dump the young out onto the ground (Errington, 1932). The nest may be so small that the bird is quite conspicuous or even ridiculous when covering eggs or young. Again it may be a huge affair and the owl completely hidden from view from below.

Few data are available on preference regarding other types of nests but it appears that the same requirements hold—a spot fairly open yet concealed, which is large enough for the needs of the young until they are able to move about freely. Nests located on ledges or in niches or caves are generally sheltered from the wind, rain, and sun, although the situation permits the young to bask in the sunshine at the entrance.

A table of ten nests located in the Ithaca area probably gives a representative sampling of the types of tree nests in the northeastern part of the United States. (See Table 1).

From an examination of their nests it is evident that horned owls clear out a certain amount of debris before the eggs are laid, and also line it with a more or less complete layer of breast feathers. Beyond

TABLE 1. Nests of Great Horned Owls in the Ithaca, N. Y. Region, 1934-1936.

No.	Locality	Situation		Type of Nest
1	Ellis Hollow	Sugar maple	27 ft.	Stick—Old hawk nest (?)
2	McAllister farm	White pine	22 ft.	Stick—Old hawk nest (?)
3	Danby Pond	White pine	34 ft.	Stick—Old hawk nest (?)
4	Danby Pond	Chestnut oak	47 ft.	Stick—Crow (?) nest
5	Conn. Hill	Chestnut	29 ft.	Stick—Red-tailed Hawk nest*
6	W. Dryden	White pine	18 ft.	Stick—Crow nest
7	Lake Ridge	White oak	40 ft.	Stick—Hawk nest
8	Sapsucker woods	Beech	24 ft.	Stick—Hawk nest
9	Sapsucker woods	Beech	40 ft.	Leaf—Grey squirrel nest
10	Trumbull's corners	Beech	21 ft.	Stick—Hawk nest

*This nest was a huge affair, apparently having been used by Red-tailed Hawks for several seasons so that the accumulated mass of material produced a structure at least five feet in diameter. The owl could not be seen at all from the ground.

that there is apparently no activity in most cases. However there are a few records of horned owls repairing or practically rebuilding an old nest. Cameron (1907) discusses a pair of Montana Horned Owls that repaired an old nest in his yard in Custer County, Montana, every year and states that by spring it was "often a storm-swept fragment". Mr. G. Lang of Indian Head, Saskatchewan, (*corres.*) has found several nests that the horned owls constructed entirely. One pair built a nest in a spruce tree on his grounds, in a location closer to his home than crows will choose and Mr. Lang is positive that there was no foundation present when the owls chose the site.

The nest lining usually consists of shreds of bark, leaves, or down plucked from the breast of the incubating bird. Rockwell (1909) suggests that feathers from their prey may be added at times. G. Lang (*corres.*) states that near Indian Head, Saskatchewan, the birds occasionally build rabbit fur into their nests before the eggs are laid. The extent of the lining of downy feathers varies considerably with individual birds from a few feathers to a fluffy mass which practically encloses the large eggs. Of the Ithaca nests, the contents of No. 1 were not examined, but the other nine contained at least a few breast feathers. At Nest No. 8 the lining practically hid the eggs; at all others the eggs were quite conspicuous from above.

On the bare floor of a hollow tree or cavity in a cliff the eggs are often enclosed merely by a rim of sticks, stones, or bits of rubbish. Huey (1935) describes a nest of *Bubo v. pallescens* in Mexico "composed entirely of regurgitated pellets". The location was between two lava blocks on a rocky hillside.

Renesting After Disturbance

The selection and occupation of a second nest is a fairly common occurrence, frequently recorded by egg collectors. After their first set is taken the birds will often choose a nearby nest and lay another set of eggs. Frequently, however, the birds will continue to occupy the original nest in spite of disturbance, and Bendire (1892) mentions that Dr. Ralph found a third set of eggs in the same nest in Florida after the first two had been taken.

In some instances the second nesting is not carried to completion. The writer found a pair of birds near Ithaca, New York, in 1935 that probably had such a history. The female was discovered sitting on an empty nest on February 25. Examination of the site every few days found the bird on the nest at irregular intervals as late as March 12. On that night there was a heavy snow and the nest was practically filled by the next afternoon. The birds remained in the region for

at least two weeks thereafter but eventually they moved and were not seen there during the remainder of the season.

T. E. Randall, of Boyle, Alberta (*corres.*) describes a similar observation on the Arctic Horned Owl in Alberta. Ten days after he had collected a set of two eggs he found the bird occupying the nest again. When he climbed the tree to investigate the bird attacked him. The nest was empty, however, and no eggs were laid in it that year, nor were any young raised in the vicinity. A pair of birds observed over a three-year period by A. L. Rand (*corres.*) near White Rock, Nova Scotia, twice failed in a second attempt at nesting.

Eggs

Of the North American species horned owls are one of the first to nest in the spring. Their eggs have in fact been taken as early as late November and early December in Florida (Forbush, 1929).* In Texas they lay in January and early February. As one moves northward a direct correlation between latitude and date of laying can be observed, until the extreme is reached in Labrador where sets are often not completed until after the first of April.

In the western part of the country the correlation with latitude is often obscured by the effect of altitude upon climatic conditions.

Table 2, compiled from a mass of records of oologists and other observers, is an attempt to demonstrate this correlation between geography and the dates at which horned owls have completed their first sets of eggs.

The usual number of eggs for the horned owl is two. Along the Atlantic seaboard this number is most frequently recorded, with three eggs uncommonly found and sets of four very rare. In Florida one egg often constitutes a full set. Bendire (1892) quotes Dr. Ralph to the effect that sixty per cent of the sets in the Ralph collection contained only one egg. In central and western North America the sets appear to be definitely larger, with three and four eggs not uncommon, and five and six occasionally reported. Bent (1938) suggests that this may be due to the more abundant food supply.

Dixon (1914) notes that Pacific Horned Owls tend to lay larger sets of eggs during wet than dry seasons and suggests that it may be because the birds find food more plentiful at such times. Randall (*corres.*) found that two and three eggs to a clutch was the usual number but that in 1932 all the nests that he examined contained four

*O. E. Baynard (*corres.*) reports a complete set of eggs from middle-western Florida taken on October 27.

TABLE 2. Average Dates of Completed First Sets of Eggs of the Horned Owl throughout the United States and Canada.

Date	Geographical Areas
Late November to early January	Southern Florida.
Late December to early February	Northern Florida, southern Texas.
Early January to late February	South Carolina, Georgia, Alabama, Mississippi, Louisiana, central Texas, southern California.
Late January to early March	North Carolina, Virginia, Maryland, Delaware, New Jersey, Long Island, Connecticut, Rhode Island, Massachusetts, Pennsylvania, West Virginia, Ohio, Kentucky, Tennessee, Indiana, Illinois, Missouri, Arkansas, Oklahoma, northern Texas, Kansas, central California.
Early February to late March	Maine, New Hampshire, Vermont, New York, southern Ontario, Michigan, Wisconsin, southern Minnesota, Iowa, Nebraska, South Dakota, northern California, Oregon, western Washington.
Late February to early April	Newfoundland, Nova Scotia, New Brunswick, southern Quebec, central Ontario, northern Minnesota, North Dakota, Montana, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Idaho, western Washington.
Early March to late April	Central Quebec, northern Ontario, southern Manitoba, southern Saskatchewan, southern Alberta, southern British Columbia.
Late March to early May	Labrador, northern Quebec, northern Manitoba, northern Saskatchewan, northern Alberta, northern British Columbia, Alaska, Yukon, District of Mackenzie, District of Kewatin.

eggs or young. He also suggests the possibility of direct correlation between the number of eggs and the abundance of food.

The interval between laying of the eggs varies from one to seven days, according to reports of egg collectors and observations of differences in the stages of development of the nestlings. Randall (*corres.*), who has collected extensively in Alberta, has found an interval of two days to be the usual period. My own observations at Ithaca indicated a similar interval. Occasionally there is a conspicuous difference in the ages of young owls in a nest. Whether such records indicate longer periods between laying of the eggs or a physiological disturbance I am unable to say.

There is apparently a low percentage of infertility in Great Horned Owl eggs. There are records of sets that were partially or completely infertile but in most cases all of the eggs hatch.

Incubation

Incubation normally begins with the laying of the first egg. As a consequence there is usually a pronounced difference in development of the young for the first week or ten days.

The length of the incubation period for the Great Horned Owl, to the best of my knowledge, has not been accurately determined. Writers have suggested various periods ranging from twenty-one to thirty-five days. The most satisfactory evidence available indicates that it is at least twenty-six and probably nearer thirty days (Bent, 1938). Dr. A. O. Gross (*corres.*) reports eggs hatching twenty-six days after being found. Dr. W. J. Breckenridge (*corres.*) made some observations near Fridley, Minnesota, which indicate a period of at least twenty-nine days.

Normally the horned owl incubates very closely, rarely leaving the nest uncovered for periods of more than a few minutes. Due to the extremely low temperatures during which this species nests in the northern parts of its range it is imperative that the eggs be protected almost constantly to prevent their chilling.

When undisturbed horned owls are inclined to be quiet and almost motionless on the nest. I have watched individuals for hours at a time which have rarely shifted the position of the body. They do take a very active interest in their surroundings, however, and even the slightest sounds attract their attention at once. The ability of owls to revolve their heads through 180° is frequently used to advantage. The most characteristic position seems to be the one in which the head is held high, eyes forward, the wings held close to the body and the tail laid out straight behind. In this position the "horns" are quite conspicuous and often give the bird's presence away immediately.

One of the most interesting and difficult problems in the study of the Great Horned Owl is the question of duties of the sexes during incubation. Bent (1938) says that both birds incubate the eggs, and suspects that the female does the larger share. Most authors suggest that the female does all the incubating while the male stands guard and brings food for his mate on the nest. In support of this hypothesis I have found numerous records of female horned owls shot on the nest but not a single instance of a male taken thus.

On the other hand pellets are seldom found beneath the nest trees, indicating that the females must leave the nests occasionally and in severe weather the other bird may take her place. Dixon (1914) observed that on certain days a Pacific Horned Owl flushed off the nest much wilder than on others. He attributed this difference in behavior

to the two birds that were taking turns in the incubation. S. F. Rathbun (*corres.*) states that male birds collected during the nesting season almost invariably have a part of their abdomens denuded of feathers, a characteristic of incubating birds. Randall (*corres.*) observed a nest occupied on one day by a "very white bird", on the next by a "medium grey bird". When the "white bird" was shot from the nest it proved to be the female.

With this question in mind I spent several consecutive nights in a blind beneath Nest 4 near Ithaca, New York. It was a period of full moon and with 10x field glasses I could see the bird on the nest clearly. On March 5, 1935, I entered the blind about 7:30 P. M., and shortly afterward heard the male bird hoot about a hundred yards from the nest. He soon flew over and alighted beside the nest. Then the regular hooting was interspersed with soft clucking notes: "*Quawk, quawk, waugh! hoo-hoo! quawk, quawk, quawk, quawk.*" These notes were accompanied by vigorous nodding by both birds and the bird on the limb bowed a few times. They also seemed to rub their beaks together. After several repetitions the bird on the nest stood up, bowed, then stepped out of the nest and he as carefully walked into it. The female flew off into the woods; the bird on the nest arranged the eggs beneath him with his bill and then settled down and all was quiet.

The female came in at 11:45 P. M., when I heard hoots and twittering notes like those a young owl makes when being fed. The female had come to the nest carrying part of some mammal, and apparently her mate was begging for food. She shared the kill with him and flew away again.

At 5:45 A. M. the bird came in and relieved her mate. There was no display of affection other than the low notes at this shifting of duties. The male flew off to an open perch a few hundred yards away and hooted a few times. His louder and clearer notes were unmistakable.

At a later stage in the incubation period the schedule of the two birds seems to have been different. Then the female was on the nest all night with the exception of a short period toward morning. In all probability there is individual variation among different pairs in their duties as well as changes in schedule at different stages of incubation.

Response to Interference

When first disturbed by man the birds usually seem quite reluctant to leave their nests and at times have to be practically lifted off them. In rare cases, judging from the observations of others as well as my

own, the birds flush from the nest as soon as they catch sight of an approaching man. More commonly they wait until the person is very close to or beneath the nest tree. Some require the additional stimulus of pounding on the tree to flush them off.

Such faithful birds usually return very soon after the climber has descended, though some individuals do not return for half an hour or more. I have had experience with three nests that were entirely deserted due to my interference. In two cases I do not believe that the birds resumed incubation after they were first disturbed. This intolerance of observation may have been due to greater shyness of these individuals or to the fact that incubation had just begun and the instinct was not well developed. The latter hypothesis is not supported by the history at Nest 4. In this case the bird came back to eggs that subsequently proved to have been fresh. It appears then that the response of the incubating owl to the approach of man varies markedly with the individual and to a lesser extent with the stage of incubation.

After the first visit the responses are usually quite different. On the second visit the owl often flies off when one is several hundred yards away and rarely allows as close an approach as on the first day. In the case of nests which have been visited daily, the birds eventually become accustomed to this interference to a greater or lesser degree and in time will tolerate a much closer approach before flying. However I have never found a bird that, after the first visit, would permit one to climb to the nest level before it left.

This increasing tolerance may be more clearly demonstrated by comparing the intervals of time between departure and return to the nest. Birds which stay away half an hour or more at the first visit may after several visits be back on the eggs in less than five minutes. The question arises, however, as to whether or not this tolerance is due to the development of the incubation instinct rather than to the acceptance of man's proximity. With the hatching of the first egg the response of flight at man's approach seems to be practically subdued by the instincts to protect the young.

Frequently, due to interference by man, crows, or other disturbing elements the eggs chill and the embryos are killed. Nest No. 4 suffered such a fate. On February 20 when I first ascended the tree the old bird was kept off for a period of half an hour, and the eggs apparently chilled. The owl sat faithfully on them for a period of at least forty-five days. The eggs upon examination proved to have been spoiled at a very early stage of incubation. On the other hand I kept birds off another nest for periods of about on hour on several days

without interfering with the hatching of the eggs. In these instances the temperature was well above freezing, though the stage of incubation may have been a factor in the ability of the eggs to withstand exposure.

Another source of interference is the harassing of crows. In this connection an interesting observation was made at Nest No. 4, located in a region where crows were numerous. The owls were seldom flushed without five to twenty of these black imps appearing to mob them as they flew off into the timber.

On several mornings I noted that the male bird usually flew in close and hooted a few times shortly after sunrise. This invariably aroused the crows and when they besieged him he flew off to a hemlock tree a few hundred feet deeper in the woods. This performance had no significance for me until one morning, after the owl had flown over into the conifers to roost, the crows began to harass his mate on the nest. Finally she uttered a few low hoots and immediately her mate appeared, alighting on a branch close to the nest. The crows at once shifted their attention to this more conspicuous enemy. After a short period of ducking and dodging this owl flew into the top of an adjacent tree in an even more conspicuous spot. Gradually he led them off through the woods by short flights and the incubating bird settled down on the nest again free of her tormentors.

This same performance was witnessed on three successive days and on several later occasions. In all probability the male's response was merely an expression of anxiety. In any event it was an effective manuever. I have never observed a similar action on the part of any other pair, nor have I found records in the literature of such a response.

Summary

1. Hooting of the males becomes conspicuous about a month before mating begins. Active courtship and mating apparently last less than two weeks.

2. Hooting of the males has a three-fold function—to express physical vigor and vitality; to warn other males of their territorial rights; and to attract a mate.

3. The hooting of the female is chiefly limited to the mating and nesting season.

4. A description of copulation in this species is recorded apparently for the first time.

5. A synopsis of the variation in general and immediate nesting sites is given. This species shows a wider range than any other North American bird.

6. The birds show considerable individual variation in the type of nest and amount of building and repair.

7. Renesting is often attempted, sometimes without a change in the nest site.

8. A table gives the average date of laying throughout Canada and the United States, showing a direct correlation between latitude and date of laying.

9. The average number of eggs varies throughout North America —one to two being the usual clutch in Florida; two throughout eastern North America; and three or four in the central and western parts of the continent. Limited evidence suggests that the number varies from year to year as well as by localities according to the abundance of food.

10. No indisputable data on the exact length of the incubation period has been found. The most satisfactory evidence indicates that it is at least twenty-six and probably nearer thirty days.

11. Great Horned Owls are close incubators unless disturbed by man. With frequent visits the birds usually develop an increasing toleration of man.

12. Both birds share in the duties of incubation. In all probability there is individual variation among pairs as well as changes in schedule at different stages of incubation.

13. At one nest the owls appeared to have found a successful method of distracting the attention of crows.

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East Lansing, Mich.

GENERAL NOTES

Conducted by O. A. Stevens

Change of Route in the Fall Migration of Nighthawks.—In the forty years of observation of the Eastern Nighthawk (*Chordeiles m. minor*) a fall migration route has been directly over Hillsboro, at least for thirty years. Every year the period of migration lasted for three days, at which time the air was filled with vast numbers. After these days only stragglers were seen. The heavy movement began on August 21, and extended to the 29th. In 1931 these birds changed their route to a line seven miles eastward, and only a few stragglers are seen over the old route.—Katie M. Roads, *Hillsboro, Ohio.*

The Sexes in Migration.—Detailed work took me afield on every suitable day during the migration season. I have noticed that the males of the Brown Thrasher and Red-eyed Towhee await the arrival of the females before moving on. The first arrival of the Brown Thrasher (*Toxostoma rufum*) was a male, and it arrived on March 19; the second one came on March 25. The males continued to arrive until the 29th, when a few females appeared. On April 3 more females were on hand. On April 4 the migration had moved on, leaving only the usual number of summer residents. Five males of the Red-eyed Towhee (*Pipilo erythrophthalmus*) arrived on February 24, and they became common on March 11. On March 23 the females arrived. On the 24th all had moved on except the few that remained as summer residents.—Katie M. Roads, *Hillsboro, Ohio.*

The Black and White Warbler in Europe.—The *Weekly Scotsman* of Edinburgh, for November 28, 1936, records the fact that at Tingwall in the Shetland Islands, about eighty miles east of the mainland of Scotland, there was picked up by the roadside, shortly before that date, a small bird identified at the British Museum as an American Black and White Warbler. The distance from the eastern normal range in North America of the species to where the bird was found is about the same as its southern migration distance, but the eastern journey across the Atlantic was almost entirely over water and that to its wintering ground largely over land. This bird was doubtless swept out of its range by storm winds. This is believed to be the first record of the finding of this species in Europe.—Samuel E. Perkins III, *Indianapolis, Ind.*

Female Grouse at Drumming Log.—About 4 P. M. on May 14, 1937, I heard a grouse drumming on the top of Ferry Bluff, an erosion remnant of about 150 acres rising 300 feet above the Wisconsin River below the towns of Prairie du Sac and Sauk City, Wisconsin. The sides and top of the Bluff are covered with oak with several small "goat" prairies in a few spots.

I worked towards the drummer by moving during the drummings, which came at intervals of about three minutes. The drumming seemed to cease for I waited several minutes longer than the usual interval when I heard a rustling on the leafy floor to my right. I watched carefully and soon saw a ruffed grouse, presumably a female, moving along the brow of the bluff (which was wooded) closely pursued by a male in full display. She seemed to move at irregular trots with pauses until the male approached to within a few inches. Her body was turned left thirty degrees to the line of progress. The male's tail was erected perpendicularly to the body and the feathers were fully fanned out. The ruffs of the neck

were fully erected and the head and neck stretched far forward and almost touched the ground. He moved after her in a zig-zag line, continually moving the body to and fro. The female apparently detected me although I stood still in my tracks. She flew when fifteen feet away and returned in the direction of the drumming log, disappearing in the trees. The male looked about a bit, then lowered his display and went toward the drumming long on foot.

He drummed again in a few minutes and I was able to find him on the log. I paced the distance from the log to the spot where the female left and found it to be fifty-three single paces. My paces average about a yard. The route taken from the log to the spot where the female left was much longer as it was apparently circuitous.

This observation would indicate that the female does come to the drumming log at times, and that the male may pursue her from here. It is possible that in this case the drumming served as a location notice from the male rather than as a territorial proclamation.—Leonard Wing, *Madison, Wis.*

A Local Nesting Habit of the Towhee.—The Red-eyed Towhee (*Pipilo erythrophthalmus erythropthalmus*) is a rather abundant summer bird along woodland borders in southern Michigan, where it nests usually on the ground with the nest rim about even with the ground level. Of twelve nests I have found only two were in shrubbery, one a foot, the other about two feet, from the ground.

While spending some time at Lovells in Crawford County in the northern part of the Lower Peninsula of Michigan, I found during July, 1937, four nests of the Towhee on an area which had been burned over two or three years before. This area was now covered with shrubbery and low trees, most of which were under seven or eight feet in height and with numerous low branches or basal sprouts. All four nests were located in this dense undergrowth, well off the ground; one was up 21 inches, another 24 inches, while two were 36 inches above the ground. These nests were found in July and are summarized as follows: Nest No. 1, July 5, two eggs and one of the Cowbird; Nest No. 2, July 8, two eggs, and on July 9, three eggs; Nest No. 3, July 9, one egg, and on July 10, two eggs and one of the Cowbird, and on July 11, three eggs and one of the Cowbird; Nest No. 4, July 11, two eggs and one of the Cowbird. In Nest No. 3 the young Cowbird and two of the Towhees left the nest on August 1, with date of hatching undetermined.—Lawrence H. Walkinshaw, *Battle Creek, Mich.*

Red Phalarope in Northeastern Illinois.—A specimen of the Red Phalarope (*Phalaropus fulicarius*) was secured by the writer on September 10, 1938, on the Lake Michigan beach north of Waukegan, Lake County, Illinois. It proved to be a male in full fall plumage except for a few small patches of the breeding plumage on the back. The skin (No. 110141) is now in the study collection of the Field Museum of Natural History, Chicago.

The only other extant Illinois specimen of the Red Phalarope which the writer was able to locate, is in the collection of the American Museum of Natural History, New York. This, a female (No. 357777, Dwight Collection No. 21134), was collected by Charles K. Worthen along the Mississippi River near Warsaw, Hancock County, Illinois, on September 27, 1883. It is very likely one of those "taken two or three times" in that region by the same collector (p. 62, Widmann, A Preliminary Catalog of the Birds of Missouri; *Trans. Acad. Sci. St. Louis*, Vol. XXVIII, No. 1, Nov. 16, 1907). The species is listed for the state by a number

of early ornithologists (Kennicott, Nelson, Ridgway), and specimens have been taken in neighboring states (southern Wisconsin and Indiana).—Frank A. Pitelka, *University of Illinois, Urbana, Ill.*

Lesser Scaup Duck Defending Nest.—That the Lesser Scaup Duck (*Mari'a affinis*) is fearless in defense of its young has often been observed, but the incident related below, of an individual defending her nest, is unique in my experience.

On a small, wooded island in Ministik Lake, Alberta, on July 20, 1931, a Lesser Scaup was disturbed from her nest in a patch of sedges near the water's edge. The nest contained eight eggs. The bird did not fly but walked in a crouching attitude toward the water. After proceeding about ten feet, she turned about, walked back in the same manner and settled upon the eggs. Meanwhile, with a companion, I was standing within three feet or so of the nest. My companion then put out his hand which prompted the duck to again leave the nest, and, moving forward with wings outspread, grasp a finger with her bill.

We returned to the nest again an hour later and the same performance was repeated with variations a number of times. A sudden movement would impel her to leave the nest only to return immediately. Not once did she fly. Sometimes she picked at the sedges around the nest, or, standing upright, re-arranged the down. Usually upon settling, she turned her tail toward us and once after doing this, turned completely about and faced us. Finally at a time when the bird was relaxed on the eggs we drew together the sedges above the nest and left her is peace.—J. A. Munro, *Okanagan Landing, B. C.*

Nesting Behavior of Kingbirds.—The writer's porch faces westward upon a row of elms, where on the evening of June 16, 1938, a pair of Arkansas Kingbirds (*Tyrannus verticalis*) were busy building a nest in a fork some twenty-five feet from the ground. It seemed but half completed and both birds were industriously bringing materials to be woven into it by the female. Several pieces of string were added, one of them so song that it became entangled in the surrounding twigs.

During an interval when both owners were away, an Eastern Kingbird (*Tyrannus tyrannus*) alighted at the nest and began tearing it to pieces with claws and bill. Hastily collecting the looser bits, she flew directly to a group of trees back of the house. Returning shortly, the female owner was greatly excited. She flitted off and on the nest, re-built and re-shaped it and then spent a time perched above it complaining shrilly. No sooner had she departed upon another collecting trip, however, than her white-breasted cousin returned, tore hurriedly at the nest, struggled with the entangling string and left with a bill full of materials by the same air-way as before. These raids were repeated until dusk, the owners sometimes surprising the thief and driving her off with furious attacks and great noise.

During the following day all was quiet, the Arkansas Kingbirds occupying the tree alone. Evening, however, saw the return of the trespasser and several severe battles ensued. Other species, especially Robins, mingled in the fray, apparently assisting the owners. A female Baltimore Oriole suddenly appeared to assist in repelling the invader, but when all had again quieted, she was seen tugging away at the long string, pulling and fluttering to carry it aloft, and in the absence of

FIG. 40. Photograph of a Lesser Scaup Duck defending its nest.
By J. A. Munro.

FIG. 41. Photograph of a Lesser Scaup Duck defending its nest.
By J. A. Munro.

the owner, taking her turn at stealing the materials of the nest. Thus the foundations of a hanging nest were soon visivle about ten feet higher up in the tree, the length of white string connecting the two nests. Strangely enough her depredations seemed to pass unnoticed, and after two or three days both nests were completed and the home life of the kingbirds and the orioles proceeded peacefully.—A. D. Whedon, *Fargo, N. D.*

A Hand-reared Arkansas Kingbird.—Returning from work one evening about the middle of July, I found twelve-year-old Charles busily engaged in catching grasshoppers and feeding them to a pair of baby Arkansas Kingbirds. He and his pal had found the birds that afternoon, apparently dislodged from their nest by the high wind of the night before. I feared that the birds would die, but could suggest no better plan. One of them did indeed die within a day or two, but through no fault of the boys. A striped ground squirrel seized and killed it while the boys were hunting grasshoppers only a few yards away. A few days later Charles avenged the bird by killing the squirrel.

The remaining bird thrived on its diet of grasshoppers until about a week later when we took it with us on a trip to the lake. The weather was rainy and insects were hard to find. We supplemented what few we could catch with bits of bread and meat. Some of the meat was highly seasoned and apparently was not suitable because the next day, "Pete", as the boy had called the bird, was quite droopy. The sun came out in the afternoon when we were able to find plenty of grasshoppers and Pete quickly "perked up".

At about this time he began to learn that he had wings and soon could make short flights from one's hand to a convenient garage roof or to the ground. Charles commented that Pete was more fun than a model airplane: "you did not have to wind him up". The next step was for the bird to fly from his perch to one's hat, shoulder or outstretched finger when a tempting grasshopper was offered.

We soon learned Pete's language. A certain lusty sound accompanied by a suggestively open mouth meant that he was hungry. Another short and fainter sound, "*pip-pip-pip*", when offered the fourth or fifth grasshopper in rapid succession, meant that he was not interested in food for the time being. Still another chirp indicated indifference or mild curiosity.

The accompanying picture was taken about the first of August. At this time Pete still depended entirely on our ministrations for his food. In another two weeks he had become self-supporting, but still welcomed an occasional grasshopper from our hands. On August 2 he was officially decorated with a Biological Survey leg-band, No. 38-127463.

Each night Pete was taken to the basement where he perched on one of the electric light wires running through the floor joists. Here he would remain contentedly until about six o'clock in the morning when he would begin to call for breakfast. He would accept food from others but was more familiar with members of our family. Without detailed records of the food, especially of weights of the grasshoppers, it would be hard to estimate the amount eaten per day, though the number probably ran as high as seventy-five.

On the evening of August 12 we were not at home until after Pete's bedtime and he was not to be found. Neighbors reported that he had appeared at the usual time and made considerable disturbance, clamoring to be put to bed. The next morning as I started for the office, I heard a familiar chirp and from a tall

tree across the street Pete came in a bee-line for my hat. There could be no doubt that he was glad to see me.

From that time on, he became more independent. He would disappear immediately in the morning. Sometimes we saw him during the day, sometimes not. Some days he returned to be put to bed; other days he remained out. After the morning of August 22 we saw him no more. The other Arkansas Kingbirds disappeared at about the same date, so Pete probably went south with them. We hope that he may return next spring with a mate and nest in our vicinity.—A. J. Pinckney, *Fargo, N. D.*

Western Henslow's Sparrow Taken in Virginia.—While engaged in field work in the West Virginia mountains in June, 1935, Maurice Brooks informed the writer that there was at that time no authentic record of Henslow's Sparrows for the State, either as a migrant or as a breeding bird. This species had been recorded as a breeding bird in forty-six of the eighty-eight counties of Ohio (Hicks, "Breeding Birds of Ohio", 1935). It is known to breed sparingly in ten of the twenty-two unglaciated counties of southeastern Ohio in territory similar to large areas of West Virginia. Several sizeable breeding colonies were then known for Ohio that were within twenty miles of West Virginia. Hence it seemed certain that the species crossed into and probably nested in, West Virginia.

Accordingly, several week-end trips were made through the Ohio River counties of western West Virginia between Huntington and Parkersburg. Few habitats of types attractive to Henslow's Sparrow were found, and these few were unoccupied, except one. On July 7, 1935, the writer discovered a small breeding colony in a narrow weedy strip of bottomland near the Kanawha River, and about six miles above Point Pleasant, Mason County, West Virginia.

Two males were singing on either side of a highway. No nests could be found but several females and a juvenal were flushed. The latter was barely capable of sustained flight but eluded capture. An adult male, however, was found dead along the roadside, possibly having been struck by an automobile. This bird weighed 13.2 grams and was in breeding condition (testes 5.5 mm. x 9 0 mm.). The skin was somewhat decomposed but was prepared, and has been donated to the collection of the West Virginia University at Morgantown. It represents, so far as known, the first record and the first breeding record of Henslow's Sparrow in West Virginia. Dr. H. C. Oberholser, of the Biological Survey, determined the specimen as typical of the western race (*Passerherbulus h. henslowi*). All Ohio specimens examined to date have also been assigned to this form.

The eastern race (*Passerherbulus h. susurrans*) has since been recorded in eastern West Virginia as follows: A migrant taken October 9, 1935, near Masontown, Preston County, by Haller, Handlan, Margolin, and Brooks (*Auk*, LIII, 1936, p. 91); breeding adults with young seen near Burlington, Mineral County, July 19, 1936, by Brooks and Haller (*Auk*, LIII, 1936, p. 453); adults seen by Maurice Brooks on July 7, 1937, near Stony River Dam, Grant County (*Redstart*, IV, 1937, pp. 68-69).—Lawrence E. Hicks, *Ohio State University, Columbus, Ohio.*

EDITORIAL

THE AMERICAN ORNITHOLOGISTS' UNION held its Fifty-sixth Annual Meeting in Washington, D. C., on October 17-21, 1938, with a registered attendance of 233 people. The program carried fifty-nine titles, and three days were allotted for their delivery. The Brewster Medal Award was granted to Dr. Thomas S. Roberts in recognition of his work on "The Birds of Minnesota". Dr. Ira N. Gabrielson, Chief of the U. S. Biological Survey, was elected a Fellow. Two Honorary Fellows and six Corresponding Fellows were also elected. Eight members were elected, including, Thomas T. McCabe, Harold Michener, Gayle B. Pickwell, E. Lowell Sumner, Jr., all of California, Austin L. Rand, New York, Alexander F. Skutch, Maryland, Herbert G. Deignan, Washington, D. C., and S. Gilbert Emilio, Massachusetts. The number of Associate Members elected was 337. The next A. O. U. meeting will be held in the San Francisco Bay Region of California on June 19-23, 1939. The official announcement has also been made that the A. O. U. will hold a meeting in May, 1942, at Philadelphia, in order to serve as host to the Eleventh International Ornithological Congress.

THE TWENTY-FOURTH ANNUAL MEETING of the Wilson Ornithological Club was held at the University of Michigan, Ann Arbor, on November 25-26, 1938. The total registered attendance was 265 (113 members and 152 visitors), and the number of papers listed on the program was forty-four. A full report of the meeting will be given as usual in the March number. Louisville, Kentucky, was selected as the meeting place for 1939.

IN BEHALF OF the Wilson Ornithological Club the WILSON BULLETIN wishes to acknowledge the generous compliment from the National Association of Audubon Societies, which we have just read on the editorial page of the November-December issue of *Bird-Lore*. Such cheering words from an institution so long and well established, and through the medium of one of our most esteemed contemporary magazines—so long associated with the name of one of America's most renowned ornithological leaders, Dr. Frank M. Chapman—will warm the hearts of all of us. If all the fine things which have been said are true, it is because of steadfastness of purpose and untiring effort. We thank *Bird-Lore* for its kindly overtures, and wish for it a long-continuation of the era of growth and prosperity which it is now enjoying.

OUR READERS may be interested in the fact that an Audubon Museum is being erected by the Federal Works Progress Administration in the Audubon Memorial Park, which is located along the Ohio River about one mile north of Henderson, Ky. The Park consists of 400 acres of high, rolling, and thickly wooded land, overlooking a "majestic stretch of the Ohio River". The two-story Museum building is built of gray stone, in the Norman style of architecture. It seems to be the plan to gather for permanent exhibition in this building a complete collection of Audubon prints, books, portraits, mounted birds, and other Audubboniana. It may be possible that such a location is a good one for an Audubon exhibit, but if so,

it would seem to us that there would be many reasons why the entire setting should be primitive and natural. The WPA report states that "A formal garden will be laid out in front of the building". Of course, the landscape architects who are in charge of such an enterprise can not forego the opportunity to insert a little of their own brain genius. There is such a wide difference in the ideals of architects and engineers on the one hand, and nature lovers on the other hand, that coöperation is usually not feasible.

Mrs. H. M. Bailey, 610 Twentieth Street, Sioux City, Iowa, has a run of the Wilson Bulletin, 1918 to 1936 inclusive, which she would like to dispose of.

We Have Seen a new type of binder for the Wilson Bulletin, which is retailed by the National Association of Audubon Societies (1775 Broadway, New York, N. Y.). The actual binding is done by the owner, at home, but the cover comes already lettered and ready to be affixed. You will need to caution the makers that you wish to have the title exactly centered on the back of the book, for they are a little careless about that. The price of the binder for one volume of the Bulletin is $1.25—not much cheaper than permanent binding, but sturdy and worth the price. With so ready a means of binding many more of us will want to preserve the volumes of the Bulletin.

In Running Through a file of papers on conservation we ran across a printed leaflet giving the "Extension of remarks of Hon. Fiorello H. LaGuardia, of New York, in the House of Representatives" on April 29, 1926. At this time he was discussing H. R. 7479, known as the migratory bird bill. This bill contained the provision for public shooting grounds, and Mr. LaGuardia was opposing it for that reason. On this subject Mr. LaGuardia said: "When the bill was before the House in the Sixty-eighth Congress I voted against it. I did so for the reason that I am strongly and unequivocally in favor of a real bill for the protection of the bird life of this country and that I am unalterably opposed to an unsportsmanlike bill, which, under the guise of a conservation of bird life bill, creates so-called sanctuaries that may be turned into shooting grounds for unsportsmen hunters to slaughter birds." Mr. LaGuardia further exposed the lobby that was behind the bill. He gave his full support to the Merritt Bill (H. R. 10433) which provided for reduced bag limits on game birds. His record in Congress shows him to be a true conservationist, and a fearless one.

With the completion of this issue of the Wilson Bulletin the Editor retires. His successor has not yet been named.

ORNITHOLOGICAL LITERATURE

LIFE IN AN AIR CASTLE. By Frank M. Chapman. D. Appleton-Century Co. New York, 1938. Pp. 1-250. Pls. I-XXXI. Price, $3.00.

Dr. Chapman here continues the record of his observations and experiences on Barro Colorado, the first instalment being given in his "My Tropical Air Castle". The present book deals with birds in part, but also relates experiences with a few mammals, and one chapter deals with a tree. Perhaps the most interesting chapter in the book is the one on the Turkey Vulture, or Buzzard. Here Dr. Chapman reverts to the old controversy on whether the vulture locates its food through the sense of sight or the sense of smell, and takes the latter view. He set up several experiments to test the birds in this behavior, and called them, for example, the Empty-house Test and Box-on-the-hill Test. From the results he reached the conclusion that the birds depended on the sense of smell in locating food, thus taking a view contrary to what we would consider the current opinion. Apparently, this controversy, which began with Audubon, has not been closed.

The book closes with a chapter on "The Past and Present" of the Barro Colorado Island and Laboratory, with many interesting bits of history and reflections. We notice that the last line on page 202 is, apparently, misplaced—an error in proof reading which is seldom found in an Appleton book. And on page 85 occurs the line: "The movements of their head seem independent of those of their body". But only a hyper-critic will notice such things. The undoubted verdict will be that the book is good reading for those who are in the least interested in outdoor life.—T. C. S.

THE LOG OF TANAGER HILL. By Marie Andrews Commons. Baltimore, 1938. Price, $2.50.

This volume will stand as a memorial to Frank Watkin Commons and his work in banding birds in Minnesota. Mrs. Commons, the author, was equally interested in the progress of the work upon which the book is based. In looking over the book several things are impressed upon the mind: a) the care and accuracy with which observations were made and recorded, especially considering the fact that the workers would be classified as amateurs; b) the wonderful opportunity in bird banding work for yielding relaxation and great pleasure to the man of the business world.

The bird banding work at the Tanager Hill Station was carried on for eight years (1923-1930, inclusive). The experiences of these bird banders from day to day are recorded in narrative form, and will be readable to bird banders as well as to many who may not be banders. At the close of the narrative the banding results in twenty-six species are summarized. And twenty-eight tables give the dates of banding and returns for as many species. The book contains a goodly number of original illustrations from photographs. A pocket map enables the reader to visualize the text descriptions. So we have here a noteworthy addition to the growing literature of bird banding lore.—T. C. S.

THE NATURAL HISTORY OF MAGPIES. By Jean Linsdale. Pac. Coast Avifauna No. 25, pp. 1-234. Cooper Ornith. Club, Berkeley, Calif., 1937.

This publication adds another to the growing list of monographic studies, since it treats both the taxonomy and the natural history, and gives a review of

the literature. Though it is doubtless unnecessary we may mention that it gives a reasonably full discussion of the subspecies, distribution, food, migration, courtship, nest, eggs, young, plumages, molt, populations, and ecological relations. From his examination of the literature the author concludes that the use of mud in the magpie nest is the normal thing. From an editorial point of view we are interested in the author's incidental comments on local faunal lists. He thinks such lists have been useful in the past, and that in the future every encouragement should be given to the publication of such lists by those "whose preference or opportunity dictates" this line of effort. We are inclined to think that such lists will always be useful for comparison, if for no other reason, but where they should be published is another question.—T. C. S.

Avian Hosts of the Genus Isospora (Coccidiida). By Donald C. Boughton, Ruth B. Boughton, and Joseph Volk. Ohio Journ. Sci., XXXVIII, No. 3, May, 1938, pp. 149-163.

In recent years considerable study has been given to the internal parasites of birds, among other animals. The paper here mentioned gives a list of 177 bird forms which are known to be hospitable to the seven known species of avian Isospora. One interesting observation is to the effect that parasites belonging to the genus Isospora seem, in general, to be associated with the "higher" orders of birds; while similar coccidians belonging to the genus Eimeria were found associated, in general, with the "lower" bird orders.—T. C. S.

Birds and Mammals of Mount McKinley National Park, Alaska. By Joseph S. Dixon. Fauna series No. 3, Nat. Park Service. Washington, D. C. 1938. Pp. i-xiv+1-236. Price, 35 cents.

The bird list includes 107 species (plus five in a hypothetical list), fully annotated as to "general appearance", "identification", "distribution", and "habits". The entire paper is illustrated with eighty-five halftone reproductions of original photographs, and one map. There is a good summary of the facts known concerning the nesting of the Surfbird. The introduction gives the information that the records are based mainly on two expeditions—one in 1926 by Messrs. Dixon and Wright, and one in 1932 by Mr. Dixon. Mr. Dixon states that he has hiked about 750 miles in Mount McKinley National Park in his field studies there. The material is well organized but is entertaining nevertheless.—T. C. S.

Letters by Rafinesque to Dr. Short in the Filson Club Archives. By S. E. Perkins III. Filson Club History Quart., Vol. 12, No. 4, Oct., 1938. Pp. 200-239.

This bit of biographical material presented by our fellow member may be of interest to many of our readers. While Rafinesque was primarily a botanist, yet he is now credited as being the first to describe and name the Cliff Swallow. The Filson Club is a historical society with headquarters at Louisville, Ky.—T. C. S.

Proceedings of the Linnaean Society of New York, for 1937. No. 49. Pp. 1-104. Price, 75 cents.

Contents: A biographical sketch of Charles Anderson Urner, by J. L. Edwards; Preliminary notes on the Behavior and Ecology of the Eastern Willet, by William Vogt; Black-crowned Night Heron colonies on Long Island, by Robert Allen; general notes, and reports of officers.—T. C. S.

Birds of Algonquin Provincial Park, Ontario. By D. A. MacLulich. Cont. No. 13 Roy. Ont. Mus. Zool. 1938. Pp. 1-47. Price, 25 cents.

A list of 169 species of birds with annotations. It is too much to expect that all readers will know the geographical location of the area treated, hence it should be given in the text. The annotations are full and instructive.—T. C. S.

A Faunal Investigation of Western Rainy River District, Ontario. By L. L. Snyder. Cont. 14, Roy. Ont. Mus. Zool. 1938. Pp. 157-213. Price, 25 cents.

A series of papers on the animals of this region, including a list of 138 species recognized as "summer birds". The list uses binomial nomenclature exclusively, although in many cases the subspecific possibilities are discussed in the annotations—a procedure which we heartily approve.—T. C. S.

Indiana Audubon Society Yearbook, 1938. Vol. XVI. Pp. 1-105. Price $1.00 (Harold Zimmerman, 915 W. Gilbert St., Muncie, Ind.).

As usual this annual contains a wide assortment of material. Mr. Donald H. Boyd discusses the bird life of the Indiana Dunes region. Mr. Frank Johnson discusses the Bewick's Wren in Indiana. Many additional short items are included—all of local interest.—T. C. S.

The following short papers are listed by title:

Preliminary Notes on the Behavior and the Ecology of the Eastern Willet. By William Vogt. Proc. Linn. Soc. N. Y., No. 49, 1938.

Record of Bird Temperatures. By Dayton Stoner, Ph. D. Circ. 19, N. Y. State Mus., Albany, N. Y., 1937.

Check List of the Birds of Michigan. By Josselyn Van Tyne. Occasional Paper No. 379, Mus. Zool., Univ. Mich. 1938.

The Breeding Birds of Tarrant County, Texas. By George Miksch Sutton. Ann. Carnegie Mus., XXVII, 1938.

Physiology of Development of the Feather. II. General Principles of Development with Special Reference to the After-Feather. By Frank R. Lillie and Mary Juhn. Physiol. Zool., XI, No. 4, October, 1938.

Review of Local or State Periodicals Printed

The *Nebraska Bird Review* for July-December (VI, No. 2) is the second number as a semi-annual publication. The leading article is on the Prairie Chicken, and is by Glenn Viehmeyer. The author gives a thoughtful review of the various exterminative factors applying to this species in the Nebraska Sandhills. The picture as painted is not bright for the future of this bird. Seven pages of general notes, a table of migration dates, and minutes of the annual meeting last spring, make up the number.

The *Iowa Bird Life for June* (VIII, No. 2) contains a very instructive article on the European Partridge in Iowa, which, however, overlooks an earlier paper on the same subject by Chas. J. Spiker, which appeared in the Wilson Bulletin of March, 1929. The remaining pages include the minutes of the Sixteenth Annual Meeting of the Iowa Ornithologists' Union last May, general notes, bibliography of Iowa literature, and reviews.

The *Migrant* for June, 1938 (IX, No. 2) reports the nesting of a pair of Prothonotary Warblers in the cavity of an empty water pitcher. These birds have taken a liberal share of ornithological attention during the past year. Messrs. Ganier and Clebsch report in the September number (IX, No. 3) the results of a week's field work in June on the top of the Great Smoky Mountains. They found eighty-seven species, which was eighty-seven more than we saw in driving over these mountains in August. But probably one must make several trips into that wonderland before one can expect to see anything but the mountains and the vast, timbered gorges.

The *Kentucky Warbler* for the summer of 1938 (XIV, No. 3) in a new cover has for its leading article a list of the waterfowl of Kentucky, by Robert M. Mengel. Following we find a detailed account of the Audubon Museum in the new Audubon State Park near Henderson, Ky. Not many months ago we read the announcement of such a proposed institution, and we are now surprised to learn that it has been built, and that it was to have been opened to the public "some time in July" last. It is stated that many relics of Audubon have already been sent to this museum for preservation, and among other things a set of Wilson's Ornithology "with Audubon's notations throughout". A note by Mr. Maslowski reports that the Least Terns were found nesting in Fulton County, Ky., as early as June 13.

In the *Florida Naturalist* for July, 1938 (XI, No. 4) Mr. Donald Nicholson offers a critique of a previously published Florida list. A short note by Mr. O. E. Baynard reports an Arkansas Kingbird in Florida. This species has been making a remarkable expansion in its range in recent years. An interesting note is to the effect that the chief of police in one Florida town has ordered the destruction of shrikes on the ground that these birds annoy the cats and dogs. This sounds a little like a joke but it may not be. Can a police officer abrogate a state law in Florida?

Review of Local or State Periodicals Mimeographed

The *Raven* is the virile and healthy offspring of the Virginia Society of Ornithology. The April-May number (IX, Nos. 4-5, 1938) gives a list of 120 birds of Chesterfield County, Va. A membership of fifty-eight is listed in the June number. Dr. Murray's "Recent records and new problems in Virginia ornithology" is the type of literature which aids greatly in promoting the scientific study of birds locally. (Lest we never have a better opportunity, we wish to say here that we telephoned Dr. Murray as we passed through his town last August, and regretted his absence). The August number (IX, No. 8) is a list of sixty-four species of summer birds of Middle Mountain, Highland County, Va., by Dr. Murray. The September number (No. 9) is devoted wholly to an annotated list of birds of Amelia and Brunswick Counties, Va., by John B. Lewis.

The *Redstart* is issued monthly by the Brooks Bird Club, of Wheeling, W. Va. The July-August number (V, Nos. 10-11) gives a list of 198 species of birds known to occur in the eastern Panhandle of West Virginia. In the September number (V, No. 12) Messrs. Frank Conner and John Pattison record the finding of a Raven's nest with five eggs in Monongalia County, W. Va. William A. Lunk

reports in the November number (VI, No. 2) on the finding of Brewster's Warbler near Fairmont, W. Va.

The *Prothonotary* is the Bulletin of the Buffalo Ornithological Society. It has always made a specialty of local records—unusual migration records and nesting records. Its purpose has been to gather as complete information as possible concerning the local birdlife. This society is to be credited with successfully conducting long field trips. They have, for instance, taken one or more field trips to the Pymatuning Swamp region of western Pennsylvania. On such occasions their party was joined by interested persons from neighboring states. The number for June (IV, No. 6, 1938) reports a successful jaunt to this region covering the dates of May 28, 29, 30; and another trip was projected for October 8-9. In the September issue (IV, No. 9) Mr. Harold D. Mitchell, in reviewing the work of the Society, suggests that a bird club is likely to succeed best by encouraging its members to specialize and to adopt ornithological projects. This suggestion is worthy of consideration by many local societies.

In the *Bluebird* for September (V, No. 9, 1938) Brother Hubert Lewis presents an original and very strong indictment of the Blue Jay. He cites three observations of the Blue Jay's predation on nestling song birds, namely on the Rose-breasted Grosbeak, on the Yellow-billed Cuckoo, and on the Wood Pewee. Another note gives a little information about the distribution of the European Tree Sparrow in the St. Louis region. In practically each issue of the *Bluebird* one finds a delightful original poem relating to nature—usually by Editor G. E. Moore, but occasionally by another of Missouri's poets.

The *Chat* for May-June (II, Nos. 5-6, 1938) first gives a fitting tribute to Mr. C. S. Brimley, followed by articles on herons and terns. In the July-August number Dr. Brimley has a brief, but most interesting, discussion of Brewster's and Lawrence's Warblers in terms of Mendelian inheritance. Another contributor tells of seeing Red-headed Woodpeckers devour an unidentified nestling. In the September-October issue (II, Nos. 9-10) Dr. J. J. Murray reports finding two young of the Least Tern at Oregon Inlet (Va. or N. C.?) on August 18, 1938. From it we also learn that the Georgia Ornithological Society has been in existence for some time, and that Mr. Earle R. Greene is the present President.

Bird Calendar of the Cleveland Bird Club for October, 1938, (No. 3) contains a report of census work in the Cleveland area. The bird students of this region are doing some very creditable field work and keeping records of it.

The *Snowy Egret* (Vol. 13, No. 2) for the Autumn of 1938 is now issued from 172 Manchester St., Battle Creek, Mich. These pages contain local bird lists mainly, but Mr. O. M. Bryens presents a diary of observations on the Warbling Vireo.

Game Research News Letter for May and November, 1938, give reports on wildlife management researches being carried on at the University of Wisconsin.

North Dakota Bird Notes (March to June, 1938) is a stapled series of weekly reports on local ornithological events in that state during the migration season. These sheets are distributed regularly to the newspapers of North Dakota for such

use as they may care to make. The project is carried out by Prof. O. A. Stevens, of Fargo.

News from the Bird Banders for May (XIII, No. 2, 1938) presents a detailed report of the banding activities of the W. B. B. A. for the year, 1937. It shows that a total of 46,828 birds were banded by the Society during that year. The number for September (XIII, No. 3) carries an important paper entitled "The unseen Roads of Bird Migration", by Kenneth C. Alexander. The gist of this paper is to emphasize the ordinary physical factors of the birds environment to explain the cause of migration routes, as well as of local routes; or that local fly-routes are caused by ordinary physical factors, such as heat radiation, winds, etc., while a migration route is simply the summation of the local routes. Mr. Alexander is preparing an elaboration of his ideas in book form.

The *Inland Bird Banding News* for June (X, No. 2, 1938) carries an announcement of the death of Mr. W. I. Lyon, the well-known leader of the Inland Bird Banding Association. Mr. Lyon was well known for his banding work with gulls and terns, but his later work with Cowbirds seems to us to have been more productive of interesting results. We believe that no paper has been published embodying all of the data and conclusions in Mr. Lyon's work, and would urge that some one undertake to collect and present the material.

The *Wildlife Review* (No. 15, July, 1938) is issued by the U. S. Biological Survey under the direction of Mr. W. L. McAtee. The issue for November (No. 16) has also appeared. This serial gives abstracts of articles in the field of conservation and wildlife management, the originals of which are widely scattered.

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